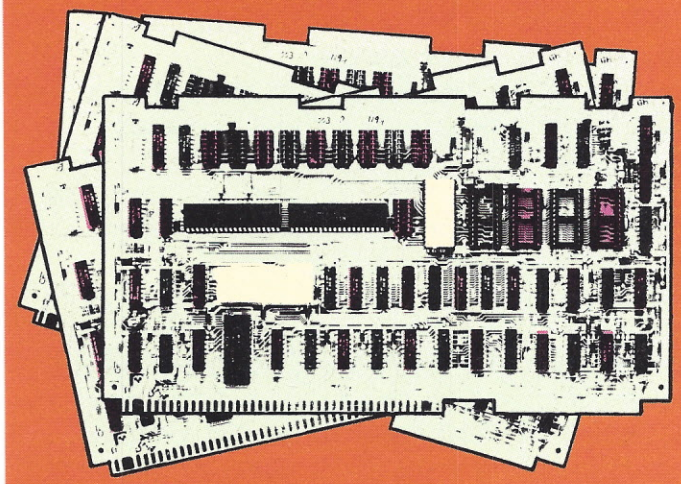
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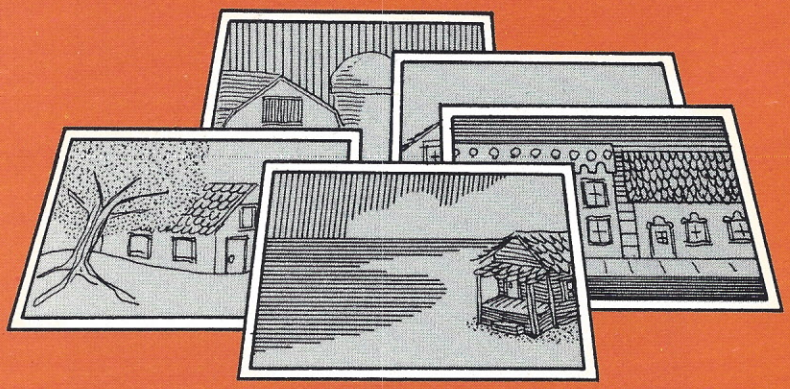
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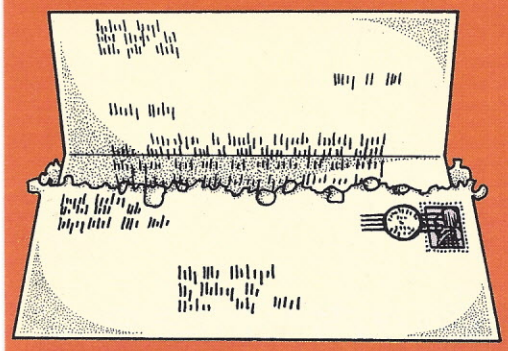


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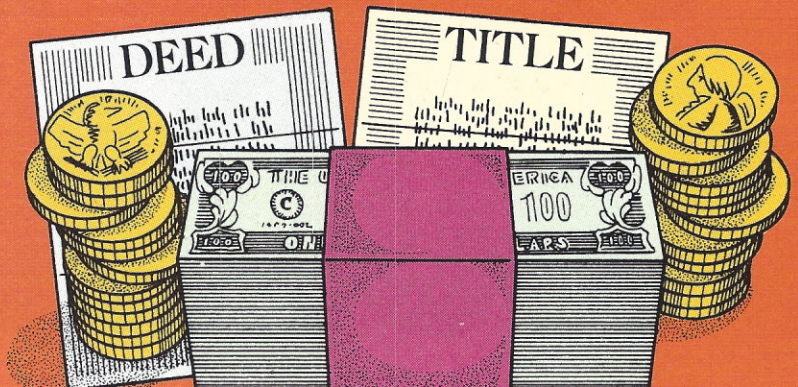
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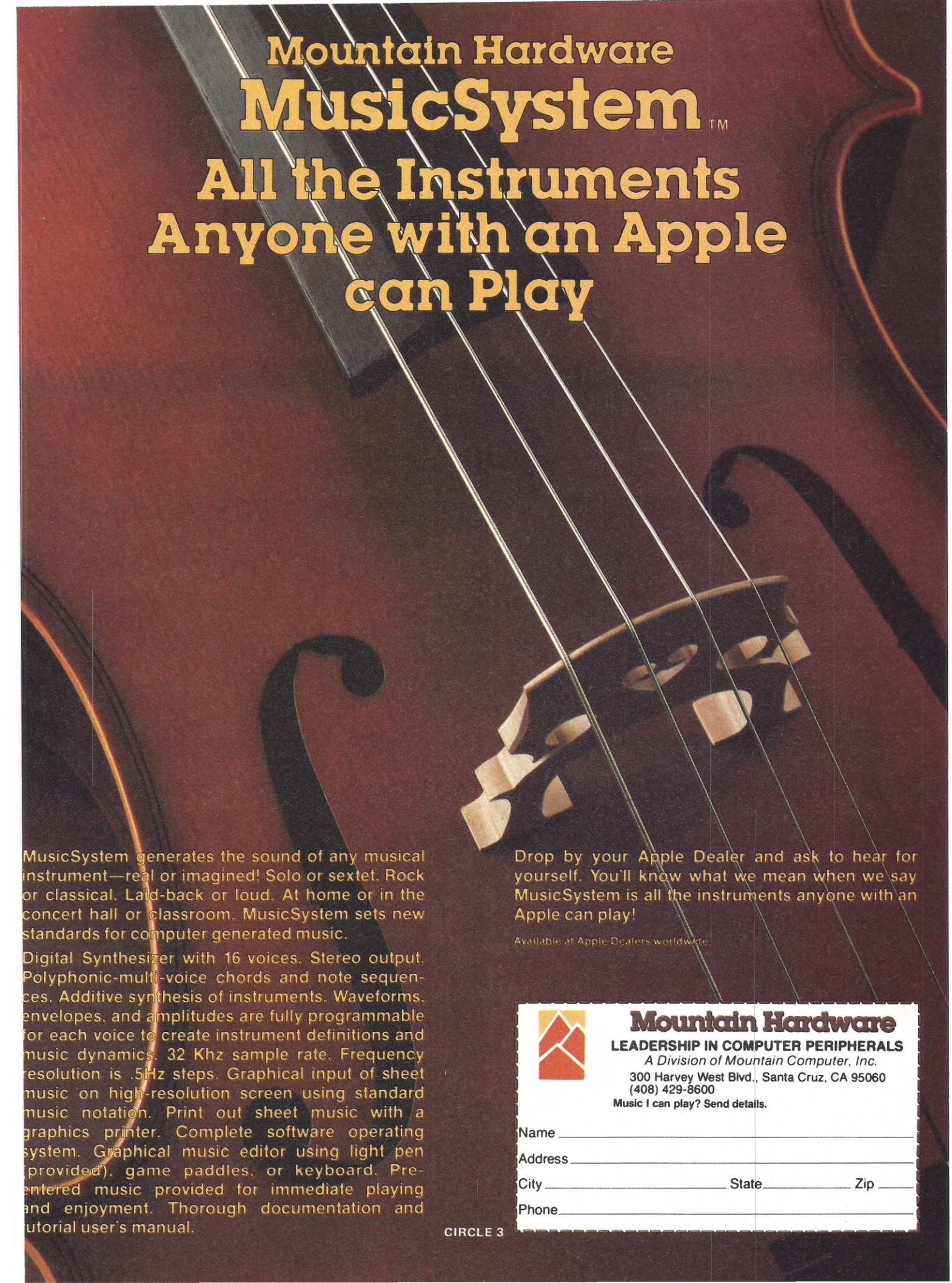
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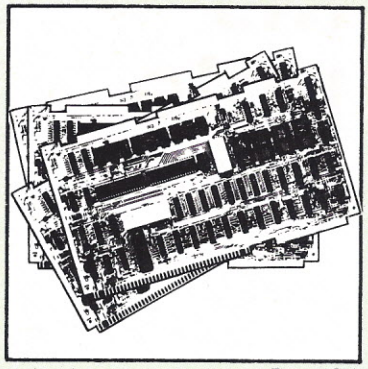
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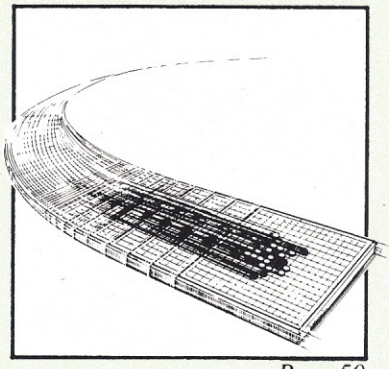
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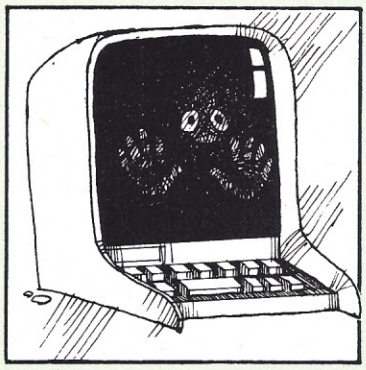
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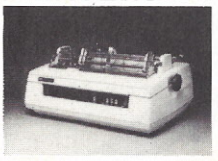
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CIRCLE 7

FEEDBACK

Housebreaking Error

Dear Editor:

Thank you for publishing my article "Housebreaking Your New Pet" in the April 1980 issue of *PC*. There is one small error in the program however. (It seems that Pet still isn't housebroken!) On line 40, the last number in the DATA statement should be 128, not 168.

As listed, the program will not bomb, but the result will appear to be some form of cipher text. The assembly routines are correct as listed, so that Pet monitor mode (SYS 1024) could be used to load in the hex code with no problems.

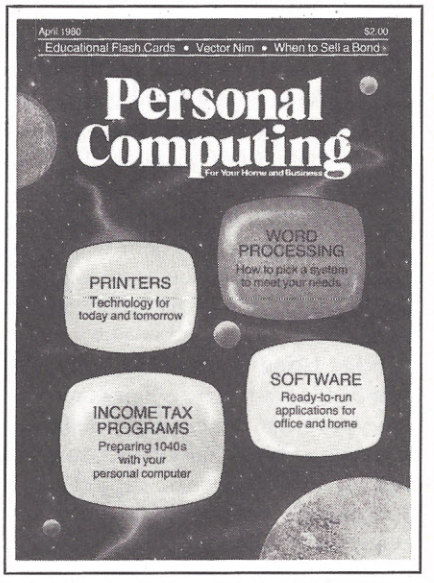
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Backgammon

Gentlemen:

Though far from being a fluent programmer, I enjoy most of your program articles by rewriting them for my Atari 800, then adding graphics, etc., and fooling with them until your next issue comes out. One game program in particular has had my undivided attention for perhaps a little too long, however. In your February issue, William Lappen's "Backgammon" has had me "RAM"ming my head against a rather hard piece of software. After adapting a number of the basic steps, and finally getting the program to run at all, it now has me completely baffled!

Assuming a first roll in favor of the computer, it begins generating all moves and assigns them values, to completion. But, what all this has to do with what it moves is beyond me. It almost moves in a random fashion, save for the fact that it moves from points where it was! Mostly, though, it likes to bear off from anything higher than the four point (if you recall, its home board is 19-24, a long way off!). It also occasionally generates an extra man for me to contend with (16 men? 17 men?), but eventually I'm sure I can



track that little bug down.

Briefly, I changed lines 430-450 from a "read" to assigned locations, rearranged the board to fit on a forty column screen, adapted the random function for the dice, changed lines 4950, 5060 and 5070 to notation, and eliminated the score compiler. Otherwise the program stands as written.

HELP!!

What I would like to know is if there were any typo errors in the program listing, or am I missing the point somewhere?

Paul Dobosz
Southington, CT

Author's note: I must congratulate you on having the patience to translate and enter the program. The problems you mentioned have not appeared on my version of the game. Another reader has commented that occasionally the number of men on the board is increased. The problem was in lines 2340 and 3500. Be sure that M(9) is loaded with the same number as is tested later.

As for the computer's tendency to bear off from anywhere on the board, check lines 2840 to 2860 and 6880 to 6960. These are the lines that tell the computer whether it can bear off.

The randomness of the computer's opening move is a puzzle to me. I have had no trouble with this. (You realize that the numbers printed are relative rankings of the possible moves and the computer should pick the largest value.) Check line 520 to be sure you are jumping to the proper line for the computer's move.

If these aids do not help you solve your problems, try some error trapping. (Sprinkle PRINTs throughout the program to show the values of key variables.) If you can isolate when the computer makes its own bizzarre moves, perhaps you can find the errors.

— William Lappen

More Than A Pet

Dear Sir:

I would like to tell you about myself and my situation. About two months ago I purchased my first computer. It was the Commodore Pet 2001, 16K, plus Commodore Model 2040 floppy disk drive and Commodore's Tractor Feed printer. This setup has totally changed the course of my life.

Since birth thirty-five years ago I have been disabled with a muscle weakness. This malady has provided me enough muscular strength to feed myself, dial a touch tone phone and type a keyboard. Prior to the purchase of my Pet there was a limited choice of interests within my physical realm. Computers afford me the needed stimuli which was missing.

I now have an unending road of pursuit to look forward to.

It is my hope that I can somehow get in touch with people doing work with the severely disabled and their specific needs. I would then be able to acquire information vital to progress in my search for an environment more conducive to my needs. Computer technology represents my emergence as an outwardly productive person. If it were not for computer technology and the descending prices this letter, written with editing capabilities galore and effort-free printout, would have been impossible.

Barry L. Giordano
6035 Park Avenue
Philadelphia, PA 19141
(215) 276-0696

Payroll Correction

Dear Editors:

I enjoyed and am trying to make use of your Payroll Program (March 1980). However, line 610 was printed incorrectly.

John Kwit
Glendale, CA

Author's note: Line 610 in my program was printed incorrectly, and should have read: 610 PRINT. —*Donald Howe*

A Physician's Office System

Editors:

As a practicing physician, I found myself bewildered by the world of computers. By studying computer literature, reading computer publications and asking a lot of questions, I was able to replace my bewilderment with a limited appreciation of the computer applications in a physician's office. Working with LaSalle Computing, Inc., I now have a very functional computerized office system.

The hardware consists of: Radio Shack CPU with 32K, Radio Shack interface with 16K, Radio Shack CRT, Radio Shack Line Printer I, two Lobo floppy disk drives, one Pertec D 1400 hard disk drive, and one cameo controller.

The floppy drives are used as a back-up for the operating system (Series 3). The hard disk drive is interfaced with the whole system to provide ten megabytes of on-line capability. This system can be alternatively interfaced with a Control Data Hawk drive (10 megabytes).

The software is an up and running system that performs the following tasks: creates and maintains patient and master file; sorts patient file alphabetically; prints listing of all patients' names; creates and maintains a procedure master file; sorts procedure master file; prints listing of all procedure codes; creates and maintains patient billing records; prints report of office invoices; prints report of Medicare forms; prints report of Blue Shield forms; alphabetizes patient name list; maintains daily patient list.

This physician/patient billing system prints on existing Medicare forms and existing Blue Shield forms that are fan-fold types. These forms are not a superbill, but rather use the generally available Medicare and Blue Shield forms.

In addition, a further feature is a general accounting system which also performs bank reconciliation as well as printing checks with the vendor address for use with clear window envelopes.

What I find to be a very useful portion of the system is a literature reference program which will: create and maintain subject master file; sort subject alphabetically; list subjects in an alphabetical order; list subject file in numerical order; create a literature reference file and produce reports of all or some literature references under that particular subject heading; copy data files from the menu screen; permit cross indexing of literature references.

Further information on the program can be obtained by writing to LaSalle Computing, Inc., P.O. Box 116, Blue Bell, PA 19422; (215) 275-7058.

David Prager, M.D.
Allentown, PA

Sorcerer Software

To the Editor:

Being the owner of a fine computer like the Sorcerer, I find it difficult to obtain much utility software. The Exidy Sorcerer does not get much support. As a technician, I know that the hardware in this well-made machine is superior to many others, but as a programmer I can't write much more than some simple games. So, like many frustrated users of this machine, I suffer also. But, I refuse to give it up because of that!

There is a fine word processor program available from RGR Software Co., called The Poor Man's Word Processor, for about $21. It's worth much more. They also have a data base maintenance program that is very good. RGR has games, home financial, and a users software swap. The address is RGR Software, 623 Medill Ave., Lancaster, OH 43130.

Want more super graphic games and CAI programs? Write Stayley's Software. Jim Stayley writes good stuff! The address is Stayley's Sorcerer Software, 22 Staman Ct., Layfayette, IN 47905.

Jack MacGrath
Billerica, MA

A Great Combination

Dear Editors:

I want to commend you on two articles in your April 1980 issue: "Basic Typist" and "Product Close-Up". I am writing this letter using both Basic Typist and Keyplus. I have found the combination of these programs to be invaluable.

I would also like to commend SJW Inc. for the fast service that I received in answering my questions and delivery of my Keyplus tape. In both cases only three days lapsed between replies. I still can't believe that, but let's hope more fast service can be found.

I have the video upper-lower mod and can attest to the fact that Keyplus works just fine in both command mode and keyboard mode. Another good feature which I like is the ability to change any mode even in the middle of editing a line. Let's hope SJW Inc. can keep up the excellent work. The documentation is accurate and simple enough for anyone to understand and I have not encountered any problems in loading or using it.

When using the Basic Typist and Keyplus you can modify the Basic Typist as follows: Delete lines 2029 to 2040. Keyplus has already converted upper-lower case letters for you.

Mark Wehmhoefer
Chicago, IL

Delayed at the Gate

Dear Editor:

I understand Basic but am not adept at speaking it in mathematical terms, so I was able to translate the "Off to the Races" program (January 1980) to display properly on my TRS-80 machine. However, I was unable to fathom the

data manipulation statements and continue to get error messages — specifically in lines 270, 330, 480, 800 and 810.

Whether changing these lines to TRS-80 Basic will result in bugs farther along, I don't know. Can you help?

Bernard A. Jenson
Princeton, NJ

Author's note: Translating a program from one dialect of Basic to another is often difficult. Let me offer a few suggestions and explanations to help smooth the way.

OTTER was written in North Star Basic. It differs from some Basics in string handling and in multiple statement lines which start with a conditional (such as line 630).

Contrary to NS Basic, some Basics execute common line statements which start with a conditional only if the condition is true. For those, line 630 should be replaced with:

630 IF T(I)>M THEN W= I:M = T (I)

N$ is the name string for the entries. It is a string of length 270 for at most 15 names in fields of length 18. N$(37,64) corresponds to the substring of N$ consisting of its 37th to 64th characters, the name of the third entry. In some Basics it would be written MID$(N$,37,64). For those Basics which allow string arrays, DIMension N$ to 15 with enough space CLEARed. Then accessing each horse's name becomes simple (270 would end with N$(I)=H$ and 330 becomes H$=N$(I)).

Line 480 uses the SQuare RooT function. Replace SQRT with SQR in some Basics.

Other problems in translating Basics usually involve PRINTing and formatting statements. "!" is an abbreviation of "PRINT" and "%2I" is a formatting statement written "USING ##" in TRS-80 Basic. For my system, "!#P" is "PRINT" to screen if P=0 or to the printer if P=2.

It has also come to my attention that some racing forms do not list the track variant (variance) in the past performances. I would hope that they compensate some way since a horse's speed or speed rating for a particular race at a particular track is worthless unless it takes into consideration track condition parameters. —*Rinaldo F. Prisco*

Speed Up Your Programs

Dear Sir:

A recent computer show provided the opportunity to compare several desktop computers for computational speed. My particular interest is in Fourier signal processing, so the following one line program was used:

FOR Z=1 TO 1000:Y=SIN(Z):NEXT Z

This syntax is Microsoft Basic. Naturally some machines require a slightly different syntax. Times to run the program were as follows:

Time (seconds)	Make/Model
134	Texas Instruments 99/4
120	Hewlett-Packard 9821
78	Atari 800
58	Hewlett-Packard 85
55	Tektronix 4051
30	Radio Shack TRS-80 Level II
30	Commodore 2001
27	Apple II-Applesoft
19	Hewlett-Packard 9825
6	Apple II/California Computer Systems 7811B

The 7811B is an arithmetic processor which uses the AM9511 math chip. The program was totally transparent and looked exactly like the example above. Now if only this board were available for my Commodore machine!

Robert G. Huenemann
San Bruno, CA

Editor's note: California Computer Systems' Model 7811B Arithmetic Processor Unit speeds execution of Applesoft programs. The unit plugs into an Apple II expansion slot. Price is $299.96. The company's address is 250 Caribbean Dr., Sunnyvale, CA 94086; (408) 734-5811. —*D. W.*

. . .still sorting. . .

Dear Sir:

Jay Parsons (Feedback, April) is correct in stating that both the Shell sort and quicksort run much faster than the bubble sort. However, in applications where short lists are being sorted this speed difference looses its significance, especially if the data to be sorted are first entered at human typing speed and then printed at the speed of the printer.

An example of a situation where sorting speed is utterly irrelevant is my checkbook program. I usually enter less than ten checks at a time, sort them using a bubble sort, merge them into the pre-existing checkbook, and print out the checkbook. Computing time is essentially zero in comparison to typing and printing time.

On the other hand, there is no doubt that for any but the shortest of lists, the bubble sort can be too slow. In other words, different tools are required for different purposes.

Mohamed el Lozy, M.D.
Boston, MA

Revision of Merging on the Pet

Dear Editors:

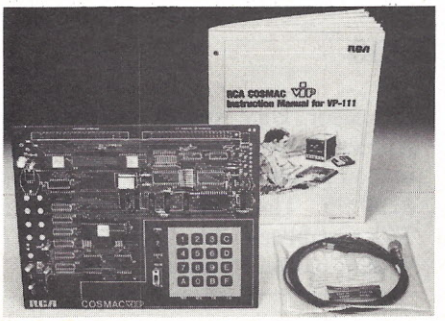
Here is a revision of the "Merging on the Pet" program in the January 1980 issue for the new ROMs.

Ronald L. Servoss
Sylva, NC

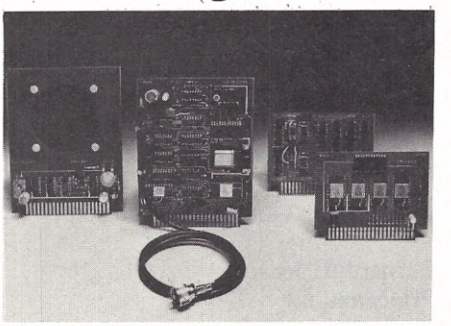
```
63001 OPEN1,1,0
63002 POKE174,1:POKE593,1:POKE603,1:POKE613,96 :PRINT"■■■"
63003 GET#1,A$:IF(ST)AND64THENCLOSE1:POKE158,0:GOTO63009 :
63004 IFA$=CHR$(13)THEN63006
63005 B$=B$+A$:GOTO63003
63006 IFVAL(B$)=0THENB$="":GOTO63003
63007 PRINTB$;:B$="":PRINT:PRINT"RUN63002":PRINT"■"
63008 POKE158,3:FORX=1TO3:POKE622+X,13:NEXT:END
63009 R$="RUN 63010":INPUT"ANY MORE FILES";A$:IFLEFT$(A$,1)="Y"THEN63001
63010 Y=0
63011 PRINT"■■■":PRINT"63010 Y=6":FOR X=1TO6:PRINTX+Y+63000:NEXT
63012 POKE622,9:PRINTR$;"■":FORX=1TO9:POKE158+X,13:NEXT:END
READY.
```

♡ = CLEAR THE SCREEN
Q = CURSOR DOWN X 2
S = Home the cursor

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CIRCLE 8

RANDOM ACCESS

Computer Center for Teachers

Educators all over the country are realizing the potential of computers in education. And working toward the goal of expanding microcomputer use in the schools are the Technical Education Research Centers, Inc., (TERC), which recently opened the Computer Resource Center (CRC) at their headquarters in Cambridge, MA. CRC is available to help schools use microcomputers for instructional and administrative purposes.

Presently, CRC is equipped with seven Compucolors, an Apple, two OSI machines, an AIM, ten KIMs and an S-100 system.

Teachers, alone or with small groups of students, are invited to make appointments to come in and use the computers for an hourly charge. Drop-in days are also planned.

CRC plans to maintain a data base of educational programs for microcomputers. This educational exchange will allow teachers to locate software for their needs, submit their own software or evaluate programs.

First, a teacher must subscribe to the data base with a one-time charge of about $75. To communicate with the data base, a teacher would either use a teletype or a microcomputer with a modem. After a teacher is connected to the base, a charge of $15 per hour during prime time, or $2.75 per hour during off hours (nights and weekends) is required.

If a teacher wants to submit a program or evaluate one the procedure is similar. Contributors of programs will receive a royalty each time the program is sold by downloading into another user's machine. Small honorariums will also be offered for program evaluations.



Vendors can also list descriptions of their programs in the data base. The actual programs will be kept at CRC.

All this information — the contributed programs, evaluations and lists — plus other educational software, will soon be placed on line, allowing teachers with microcomputers and a modem to locate the material they need.

"We are collecting listings of educational software now," said Ms. Adeline Naiman, Managing Director of TERC. "I hope we'll also collect teacher generated software, then have other teachers evalute it, evaluate it ourselves and try to provide at least a listing on a national data base that anybody can buy into and ultimately provide the programs themselves."

Ms. Naiman said CRC also offers a wide range of workshops for teachers. Five standard workshops now set up can be modified to fit other needs. Teachers can schedule a workshop at their schools or come to Harvard Square in Cambridge or other sites.

All these workshops involve "hands-on" practice. Titles are: "Microcomputers in Teaching," "Microcomputer Hardware Survey," "The Microcomputer in the Laboratory," "Modern Electronics," and "Digital Design."

TERC, incorporated in 1965, is an independent, publicly owned, nonprofit corporation. Besides the computer center, it offers services in education and guidance for the handicapped,

for special needs students, for adults contemplating a career change, for women pursuing jobs in traditionally male dominated fields, and for educators and scientists concerned with electronics instrumentation and microcomputers. There are three major TERC centers in the country, one in Waco, TX, and two in Cambridge, MA.

CRC welcomes participation from local teachers and school personnel. Write CRC/TERC at 8 Eliot Street, Cambridge, MA 02138; or call (617) 547-3890.

—by Marjorie J. Morse

Boston Marathon Runners Getting Slower

Runners in the 1980 Boston Marathon were shorter, lighter and older than their counterparts in the 1979 event. As a group, the runners also had less stamina and slower times than those who computed in last year's race, though women in general did markedly better than they did the year before.

A Honeywell Level 6 computer compiled these statistics and scored and timed the race right at the finish line. Here's a quick rundown of the data:

In 1979, the "typical" runner was 5' 9", weighed 147.6 pounds and was 34.5 years old. In 1980, he "shrank" 1 inch to 5-foot-8, lost one-tenth pound to 147.5, and aged three-tenths of a year to 34.8. Perhaps as a result of simultaneously getting smaller and older, the average runner took 1 minute 25 seconds longer to complete the race (up from 3:01:15 in '79 to 3:02:40 in '80). And all along, everyone thought it was the heat that was causing the slower times.

In 1979, according to Honeywell, three out of every four official starters completed the race (4958 out of 7910, or 75.3 percent). In 1980, the percentage of runners completing the race fell off significantly (3663 out of 5471, or 66.9 percent).

In 1979, men as a group completed the course in 3:00:28; in 1980, 2112 men under 40 ran the course in an average time of 2:55:10, while 1315 masters (over 40) averaged 3:12:34 for a combined average time of 3:01:50 for males.

Women, on the other hand, bettered their 1979 time of 3:16:25 to 3:13:33, although fewer of them entered and completed the race. In 1979, 296 out of 521 female entrants crossed the finish line (56.8 percent); in 1980, 236 out of 456 (51.7 percent) finished the course.

Interestingly enough, the Honeywell computer reveals that the age group with the largest contingent of runners continues to be the 40 to 44 group. In 1979, 1636 of them entered the race and 1197 completed it (73.1 percent). In 1980, 1189 started from Hopkinton and 815 of the them crossed the line (68.5 percent). For the last two years, the 40 to 44 age group accounted for approximately 22 percent of all entrants and for more than 20 percent of all finishers.

Finally, the new, more stringent qualifying times (2:50:00 for men, 3:10:00 for masters and 3:20:00 for women) appear to pose a problem only for the first two groups. Women, as a whole, bettered their cutoff times by 5 minutes 23 seconds, while men under 40 averaged 5 minutes 10 seconds over the prescribed time and masters averaged 2 minutes 34 seconds over theirs.

Printer Speeds Lab Results to Doctors

Clients of Statlabs, Inc., a Wichita based independent clinical laboratory, don't have to wait as long for test results now. The Lab is using Texas Instruments Omni 800 Model 810 Receive-Only Printer to transmit results to doctors quickly and accurately.

Headquartered in Wichita, KS, with branches in Lincoln, NB, and Kansas City, MO, Statlabs performs laboratory procedures for doctors, clinics and hospitals. "We offer a full range of clinical procedures, including blood tests, urine tests and cultures," said Charles E. Lowry, Vice President of Statlabs. "Because we service such a large geographical area and offer a wide spectrum of tests, we need an efficient system for delivering test results to the client. We also need to provide results in written form, as documentation for patients' files," Lowry added.

"Our company sells a service, the analysis of lab tests. The key to that service is the transmission of test results," Lowry said.

Statlabs provides the 810 Printer for doctors or hospitals using the service to process lab work. The client sends lab samples by courier or express mail, then Statlabs analyzes the samples and transmits the results to the 810 in the customer's office.

Many of Statlabs' clients prefer to locate the 810 right at a courier's office. Then the test reports can be transmitted during the night for delivery to the client the next morning.

"We run many tests, and because of different medical specialties, doctors require a wide variety of reporting forms," Lowry explained. The 810 can accommodate multiple-part forms and different widths and thicknesses of paper. And, the person receiving the report can adjust the thickness control, for instance, while the printer is operating.

Antiskid Brake Control System

Microcomputers helped develop a new antiskid brake control system designed to maintain vehicle stability and steerability during an emergency braking on any road surface.

The new system, developed by Robert Bosch GMBH of West Germany with American Microsystems, Inc., Computers, depends on the fact that, with the brakes applied, only a rolling wheel provides lateral support at optimum deceleration. A locked wheel cannot transmit lateral forces; therefore a car with locked wheels loses steering control and stability and may skid or spin around. That is why safety engineers advise drivers to pump the brakes when stopping on wet roads, ice or snow.

To prevent the wheels from locking, the Bosch antiskid brake control system — ABS — continously senses whether any of the wheels tend to lock. The wheel signals are processed by a set of tiny metal-oxide-silicon microcomputers developed by AMI.

The electronic control box activates the hydraulic unit, modulating the brake pressure with electromagnetic valves.

This action simulates pumping an ordinary brake, but the computer can "pump" much faster than a driver. And the system modulates the pressure in the wheel brake cylinders individually to obtain optimum stability and deceleration.

Three custom-designed microcomputers are used. One watches over the sensors on the right front wheel and the drive shaft, one over the left front wheel and drive shaft and the third functions as a safety monitor, to make sure the system is working properly. If a system malfunction occurs, the monitor circuit returns the brakes to normal operation and flashes a warning on a dashboard indicator.

Bosch and AMI developed the microcomputers by forming a team composed of AMI integrated circuit designers and Bosch automotive engineers.

On test tracks and highways in West Germany, ABS has safely stopped cars on all kinds of road surfaces, on straight roads and curves, said the company. On dry roads it also reduces the wear during emergency braking.

The Bosch antiskid brake system is currently offered as an option on a number of European cars. It is also being adapted for use on trucks and other vehicles, said the company.

Computer Nanny

Four-year-old Gemma Zawadski has a computer for a nanny.

Instead of an apron and a cozy lap, it has tape drives and circuitry and typewriter keys.

Instead of a nickname like Nana, it's called Orca III. But it soothes Gemma when she cries, tells her a bedtime story and will teach her English, French and German when she starts to talk.

"About the only thing it can't do is change the baby's diapers," said Gemma's father, Richard Zawadski, the 28-year-old computer consultant who built Orca III.

Orca III is more than just a nanny. Zawadski has programmed the electronic whiz to do household chores as well — turning on lights, opening the garage door and guarding the house against burglars.

"Pretty soon I can just ring up from work and have it switch on the microwave oven before I come home," he boasted.

Last November, for $6600, Zawadski bought the American ITT 2020 home computer to use in his business and educational work. The baby arrived on Feb. 29.

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"Now let's see, for optimum results add 1.29987143 cups of flour."

Low- and High-Altitude Balloons Help Scientists

Imagine studying air pollution by floating along in the midst of it in a balloon. Or locating black holes in space with balloons. Scientists are using balloons, designed with the help of computers, for these and other projects.

Design engineers at Minneapolis-based Winzen International created a low-altitude balloon that floats over cities at the same speed, and thus, in the same air mass, as pollution fumes and particles. Scientists ride in the gondola and run chemical tests to compare air composition in different cities.

To properly balance all the design variables involved in building the balloon, Winzen engineers used the resources at United Computing Systems, Kansas City, MO. United Computing offers both software and services, providing users access to four giant computer complexes as well as the Cray-1 supercomputer. UCS emphasizes services to large scale scientific and engineering projects.

"There are numerous factors which must be considered when designing high-altitude balloons," said Jean Nelson, vice president of engineering at Winzen.

"Design engineers must consider the function of a balloon, and coordinate its weight and volume to meet the requirements of the payload and the altitude at which it will function. To control flight operation, the ballast and valving must also be calculated," he noted. These factors determine the size, shape and detailed design of each balloon.

Winzen manufactures balloons ranging in size from 1000 to 70,000,000 cubic feet. The walls of a balloon, which are made up of synthetic material, can be as thin as 0.35 mil. Balloons with these types of specifications must be designed to carry thousands of pounds into the stratosphere, Nelson said.

While high-altitude balloons are used for everything from weather forecasting to aerial sports, Winzen designs them mainly for scientific purposes. Recently balloon projects include measuring the atmosphere and observing cosmic rays. "In a particularly exciting space project," Nelson said, "scientists are using Winzen balloons to locate black holes in space." Black holes are areas with such high levels of gravity that everything, including light, can be pulled into them, he explained.

Winzen balloons are also used for satellite communications development. To test the strength of the space instruments, they are carried to high altitudes and dropped to simulate re-entry into the earth's atmosphere.

Advantages of using balloons, according to Nelson, are their relatively low cost, ability to carry heavy payloads, and the fact that the equipment used can be recovered, an important requirement for scientific testing.

Winzen International not only uses United Computing computers to design balloons, but also for accounting and project control information.

Exchange for the Handicapped

The Amateur Radio Research and Development Corporation (AMRAD) has activated the Handicapped Educational Exchange (HEX), a computer information storage and retrieval system which is available by dialing (703) 281-2222.

HEX will provide up-to-date information on the education of, and communications with, the handicapped. HEX is supported by a federal grant from the Bureau of Education for the Handicapped (BEH). Messages entered into HEX should be related to: the handicapped, education or communications, and microcomputer technology.

To communicate with HEX, you'll need either a 110- or 300-baud ASCII or 60-words-per-minute Baudot terminal. The ASCII terminal may be either a computer or a printer equipped with a Bell 103 or 113 originate modem. The Baudot terminal, used for communication by the deaf, uses a Weitbrecht modem. The same telephone number will be used for either type of terminal.

AMRAD's address is 1524 Springvale Ave., McLean, VA 22101, (703) 356-8918.

English-to-Arabic Translations

A computer-assisted English-to-Arabic translation capability was unveiled at Weidner Communications, Inc., in a demonstration for Saudi Arabian officials and businessmen.

The complexities of Arabic made computer translation appear impossible to most language experts, said a Weidner spokesperson. One reason is that each of the 27 letters of the Arabic alphabet can have up to four different character forms. And the four positions of each letter complicate it more.

The translation system can produce unedited or raw text at speeds up to 14,000 words per hour. It utilizes the skills of a professional translator to produce high-quality, finished text at rates up to 2000 words per hour.

☆☆☆ Announcements ☆☆☆

Educational Funding

A handbook to help educational institutions identify sources of financial support — enabling acquisition and use of microcomputer technology for instruction — has been published by Bell & Howell's Audio-Visual Products Division, Chicago.

Titled "Funding Report for Microcomputers," the 44-page publication is the result of Bell & Howell contact with officials of eight federal agencies and the Department of Education in all 50 states. The publication provides information about federal programs that can be used to acquire microcomputer hardware and courseware for classroom use. Abstracts of 19 federal programs list the agency responsible for administration of the funds, program objectives, uses for which the funds can be expended, qualifications, proposal deadlines, total funds available, size of average award, and appropriate contact for more information.

Special sections contain guidelines for the educator on how to write effective and successful proposals. The publication also lists addresses and phone numbers of the 10 regional HEW offices and state-level contacts for information and assistance with federal programs.

The report is available from local Bell & Howell dealers or from Bell & Howell Audio-Visual Products Division, 7100 N. McCormick Road, Chicago, IL 60645.

Three Shows

Three business and home computer shows for end-users will be held in Washington D.C., Chicago and Boston. The shows, produced by National Computer Shows, feature small and medium-sized business systems, scientific and engineering computers, microcomputers and electro-technology.

The Mid-Atlantic Business & Home Computer Show is scheduled for September 18-21, 1980, at the D.C. Armory/Starplex, Washington, D.C. The Mid-West Business & Home Computer Show will be presented at McCormick Place, Chicago, IL, October 16-19, 1980. The Northeast Business & Home Computer Show will be held at Hynes Auditorium/Prudential, Boston, MA, November 20-23, 1980.

Show hours are Thursday through Saturday, 11 a.m. to 9 p.m. and Sunday 11 a.m. to 6 p.m. General adult admission is $5. For more information contact National Computer Shows, P.O. Box 678, Brookline, MA 02147; (617) 524-4547.

Astrology

Computerize Astrologers Now Development Organization (CANDO) has been formed to develop computer awareness among astrologers. Proposed projects include educational programs, software development, information and data exchange, and an international newsletter. CANDO meets the first Sunday of each month at 2 p.m. at the New York Astrology Center, 127 Madison Ave., New York, NY 10016, contact Henry Weingarten; (212) 679-5676.

Education Conference

Western Educational Computing Conference will be held in San Diego, CA, November 20-21, 1980. Its theme, "Educational Computing in the '80s", will feature papers and seminars on the use of computing in higher education for instruction, administration and research. Luncheon speakers will be Capt. Grace Hopper, USN, and Bernard Luscombe, President, Coastline College. For further information contact Ron Langley, Director, Computer Center, California State University, Long Beach, 1250 Bellflower Blvd., Long Beach, CA 90840; (213) 498-5459.

Forth Dimensions Expands

As the computer language Forth enters its second decade, the Forth Interest Group has expanded its newsletter Forth Dimensions. Now in a bound, journal form, the newsletter offers Forth-related events from around the world, with technical and historical articles.

Membership and a six issue subscription to Forth Dimensions are $12 in USA, Canada and Mexico; overseas by air is $15. Issues 1 through 6 are available as a set for $6 (domestic) or $7 overseas. New members will automatically receive all issues, beginning with Number 7. Write to Forth Interest Group, P.O. Box 1105, San Carlos, CA 94070.

Health Newsletter

Data Bits is a monthly newsletter for health planners, published by Happenney Associates. This newsletter aims to coordinate nationwide the data and automation efforts of health planners within the 205 health systems agencies (HSAs) and 51 state health planning and development agencies (SHPDAs). It examines technological advances in automated data processing which may affect health planners. Initially it should help serve as a base of information for health planners making decisions about automating their data analysis, plans development and administrative functions. Items of interest regarding happenings at the federal level are provided as well as information regarding

current activities of HSAs and SHPDAs, said Hapenney.

Articles for publication are welcomed as are letters and comments from readers. Such contributions should be received by the tenth of the month preceding publication. Subscriptions are available at $60 per year with special rates for HSAs and SHPDAs. Single issues are available for $5 per copy. For further information, contact Pam Rubinstein, Assistant to the Editor, Box 1076, Columbia, MD 21044; (301) 596-0874.

International Apple

The International Apple Core is a non-profit independent organization acting as the parent organization for local Apple Computer user groups. Membership is not open to individuals, although they may subscribe to the IAC quarterly publication. The organization, a data center, offers information on hardware, software, application notes and programming tips to member groups. Member groups can access and contribute to the software library made available to IAC. For more information contact the International Apple Core, P.O. Box 976, Daly City, CA 94017.

London Club

Several London computer clubs have formed the Association of London Computer Clubs. The main function of this association is to coordinate activities in the London area. The first major event is a computer fair to be held on July 11-12. The show hopes to give small, local retailers a chance to exhibit their products and also hopes to attract hobbyists, educational users and local businessmen. For more information contact the North London Hobby Computer Club, Polytechnic of North London, Holloway, London N7 8DB, tel. 01-607-2789; telex 25228.

Psychiatry/Psychology

Computers in Psychiatry/Psychology is a bimonthly newsletter for professionals interested in the use of computers in psychiatry and clinical psychology. Three pages of each issue are devoted to descriptions of the activities of subscribers. Computer work is being carried out by subscribers in such fields as neuropsychiatric and MMPI testing, problem assessment, history taking, biofeedback, computer psychopharmacology consultation, EEG analysis, computerized psychotherapy, the development of mental health information systems and computer assisted instruction. Many readers are using, or planning to use, micros or minis for office management functions including word processing, billing, and record keeping.

Each issue of the 3 year old newsletter contains 13 pages of original articles, summaries and reviews, as well as an ongoing bibliography and a program catalogue. For subscriptions to Vol. 3, send $25 ($35 outside the US and Canada, institutions and corporations) to: Computers in Psychiatry/Psychology, 26 Trumbull Street, New Haven, CT 06511. Volumes 1 and 2 are also available for $25 to individuals and $35 to institutions and corporations. Volumes 1, 2 and 3 can be ordered as a package for $60 by individuals, $75 by institutions and corporations.

Apple for the Teacher

Apple for the Teacher is an educationally oriented user group emphasizing the educational uses of the Apple Computer. Its newsletter features reviews of educational software, current information on educational computer grants and educational computer research. The group is operating the national computer assisted instruction library for the Apple Computer and is receiving donations from throughout the world. For further information, contact Apple for the Teacher, Ted Perry, 5848 Riddio Street, Citrus Heights, CA 95610.

AIM Newsletter

A newsletter, *Interactive,* for professional owners of AIM 65 microcomputers is now available on a subscription basis from the Electronic Devices Division of Rockwell International Corp.

The newsletter is edited by Eric Rehnke, a microcomputer applications engineer who formerly published his own microprocessor journal.

For information contact *Interactive,* Rockwell International, Electronic Devices Div., 3310 Miraloma Ave., P.O. Box 3669, Anaheim, CA 92803.

New Jersey Show

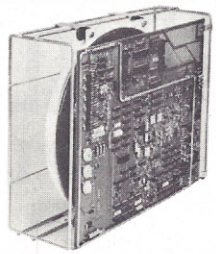
The 1980 New Jersey Personal Computer Show and Fleamarket (NJPcs) will be held Saturday September 27 and Sunday September 28 at the Holiday Inn (North), at Newark International Airport (NJ Turnpike Exit 14).

The show will feature an indoor commercial exhibit area, a large outdoor fleamarket, and user group meetings/forums on the TRS-80, Pet, Apple, Heath and other popular systems. For more information contact NJPCS, Kengore Corporation, 9 James Ave., Kendall Park, NJ 08824; (201) 297-6918.

Got an Unusual Application?

If you use your computer for an interesting, intriguing or unusual application, our readers would like to hear about it. Why not write up a short (500 to 1000 words), original article telling us about it? Make it light and newsy, and include black-and-white photos if appropriate. Send your submission to Random Access, *Personal Computing,* 1050 Commonwealth Ave., Boston, MA 02215.

PRIAM Hard Disks Now Available from SIRIUS SYSTEMS!



PRIAM's high-performance, low-cost Winchester disc drives speed up throughput and expand data storage from 20 megabytes to 154 megabytes. And a single controller can be used to operate 14-inch-disc drives with capacities of 33, 66, or 154 megabytes or floppy-disc-size drives holding 20 and 34 megabytes. So it's easy to move up in capacity, or reduce package size, without changing important system elements or performance.

- *Fast, Linear Voice Coil Positioning*
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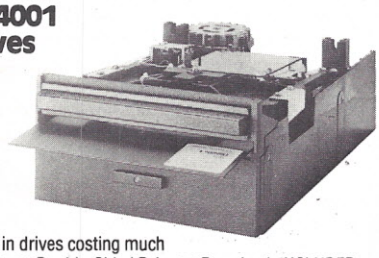
THE PRIAM LINEUP

Model/Disc Size	Capacity	Size	Weight	Price
DISKOS 3350 (14")	33Mbytes	7" × 17" × 20"	33 lbs.	$2995
DISKOS 6650 (14")	66 Mbytes	7" × 17" × 20"	33 lbs.	$3749
DISKOS 15450 (14")	154 Mbytes	7" × 17" × 20"	33 lbs.	$4695
DISKOS 2050 (8")	20 Mbytes	4.62" × 8.55" × 14.25"	20 lbs.	$2995
DISKOS 3450 (8")	34 Mbytes	4.62" × 8.55" × 14.25"	20 lbs.	$3745
DISKOS 570	5.3 Mbytes	floppy-size	(low)	(low)
DISKOS 1070	10.6 Mbytes	floppy-size	(low)	(low)

All PRIAM DISKOS Drives have a Transfer Rate of 1.03 Mbytes/Sec.
Optional SMD interface available for $150.

SIRIUS SYTEMS offer cases and enclosures for all PRIAM Hard Disk Drives. All 14" Winchester Drives will mount in our 14" Standard Case. The 8" Winchesters have two alternatives: a single drive case and a dual drive case. All SIRIUS SYSTEMS Winchester drive cases include Power Supply, internal cabling, switches, fan, extra AC outlet (not switched, but fused) and possess very adequate ventilation. Drive addressing is done on the rear of the Case and not on the drive iteself to provide ease of use during operation. All WINCHESTER DRIVE Cases are Warranted for a full year and come in our standard blue-black color scheme. Consult us for current availability and pricing.

Remex RFD 4000/4001 8" Floppy Disc Drives Double sided . . . Double density!!



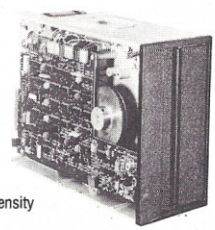
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RFD 4001, $569.95

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RFD 4000/4001 Technical Manual **6.95**
Connector Set #3 (AC, DC, Card Edge) . . **10.95**
Connector Set #4 (AC and DC) **2.95**
RFD 4000C/B Cabinet (for use with Power Modules) **29.95**

Remex 1000B . . . If you've been looking for a less expensive floppy disc drive, but not wanting to sacrifice quality — this is it!



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Write Protect Option **$19.95**
Connector Set #1 (AC, DC, & Card Edge) . . . **$10.95**
RFD 1000B Technical Manual . **$5.95**
RFD 1000B CASE (for use with Power Modules) **$29.95**

SIRIUS 8" DISK POWER MODULES

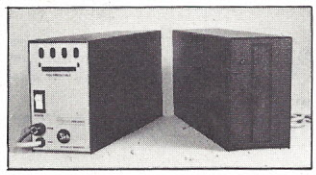
The Single and Dual Drive Power Modules are designed to provide DC and (switched) AC power for one (the Single Drive Power Module) or two (the Dual Drive Power Module—the DDPM will power three RFD 4000s or 4001s) 8" Floppy Disk Drives. Many features are included for safe and reliable operation and the Power Modules come with our standard 180 day WARRANTY (the Open Frame Power Supply warranty is for 2 years). All Power Modules will work with either the RFD 4000C/B or RFD 1000B case (color schemes match also).

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Power Module (DDPM) **$139.95**

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Power Module (SDPM) **119.95**

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- *5 ms track-to-track access time*
- *Auto-eject*
- *180 day WARRANTY*
- *Exceptional speed stability — 1½%*
- *Single density (FM) or double density (MFM/ M²FM)*
- *Ultra high reliability*
- *2 year Power Supply Warranty*
- *Mix any or all 80+ Series on the same cable!*
- *Includes user accessible plugboard for drive reconfiguring*

SPECIFIC CHARACTERISTICS

The **SIRIUS 80+1** is a single sided, 40 track, highly reliable Floppy Disk add-on. Offering 5 more tracks than the Radio Shack model, it cost $140 less! Formatted data storage is 102K/20K bytes single/double density.

SIRIUS 80+1 . . . . . **$359.95**

The **SIRIUS 80+2** is a dual sided, 70 track (35 per side), highly versatile Floppy Disk unit. It appears to the TRS-80* as TWO 35 track drives, yet COST LESS THAN HALF THE PRICE! Even greater savings result, since data is recorded on both sides of the media instead of only a single side. Using the plug board, it may be reconfigured for other computer systems! (The 80+2 operates as Drive 0 and any of the other three addresses (with the sandard Radio Shack Cable) or as any of four drives (with the SS Standad Cable).) Formatted data storage is 80.6K/ 161.2K bytes single/double density.

SIRIUS 80+2 . . . . . **$449.95**

The **SIRIUS 80+3** is a single sided, 80 track, "Quad" density Floppy Disk unit. Offering 2⅓ times the storage of a Standard Radio Shack drive, the 80+3 greatly reduces the need for diskettes correspondingly. Additionally, because of the increased storage and faster track-to-track access time, the 80+3 allows tremendously increased throughput for disk based programs!!! The 80+3 INCLUDES SIRIUS's TRAKS-PATCH on Diskette. Formatted data storage is 204K/40K8 bytes single/double density.

SIRIUS 80+3 . . . . . **$489.95**

The **SIRIUS 80+4** Floppy Disk add-on is a double sided, 160 track (80 per side), 5¼" monster! The ultimate in state-of-the-art 5¼" Floppy Disk technology, to 80+4 is seen by the TRS-80* as two single sided disk drives, each with 80 tracks. Thus, in terms of capacity one 80+4 is equivalent to 4⅔ standard Radio Shack drives — a savings of over 73% (not to mention diskettes!!!). (With a double density converter, the available memory is huge!) The 80+4 is similar to the 80+2 in that it arrives configured as Drive 0 and any of the other three addresses (with the standard Radio Shack Cable) or as any of four drives (with the SS Standard Cable). The 80+4 INCLUDES TRAKS-PATCH on Diskette. (The plug board is also included.) Formatted data storage is 408K single density or 816K bytes double density.

SIRIUS 80+4 . . . . . **$624.95**

All 80+ Series Floppy Disk add-ons operate a 5 milliseconds track-to-track access time (eight times faster than the SA 400) but are Expansion Interface Limited to 12 milli-seconds for the TRS-80*.

*TRS-80© Tandy Corp.

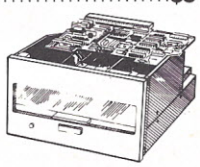
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  - *Utilization of "Quad" density (96 tpi) 8" or 5¼" Disk Drives*
- *Control of up to four WINCHESTER type PRIAM DISKOS Disk Drives*
  - *8" or 14" may intermix on the same cable*
  - *Accommodates 8" and/or 14" drives of 5.3Mbytes to 154Mbytes*
  - *Ultra-Fast data transfers*
- *Extremely flexible host-controller interfacing*

SPECIFIC SOFTWARE FEATURES INCLUDE:

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- Easily interfaces to standard operating systems (TRS-DOS*, CP/M***, etc)
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- Performance parameters may be changed by EPROM replacement or Dynaminic Reprogramming

Dedicated systems cards are also available on a limited basis for the STD-BUS and the S 100. These cards feature shared memory also (again, software selectable) in addition to the regular OMEGA Series Controller Module features. Consult SIRIUS SYTEMS for current price and availability for the entire line of OMEGA Series Memory Units and Controllers. **Dealer inquiries are invited.**

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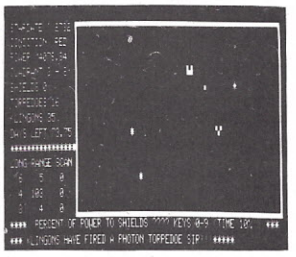
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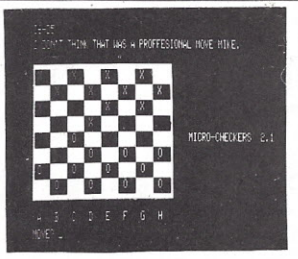
CIRCLE 10

SOFTWARE → TRS-80 ← SOFTWARE



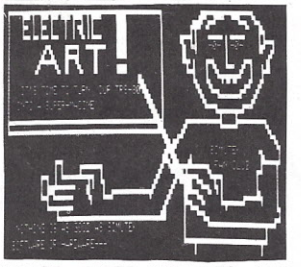
PACKAGE ONE INCLUDES: GRAPHIC-TREK "2000" — This full graphics, real time game is full of fast, exciting action! Exploding photon torpedoes and phasers fill the screen! You must actually navigate the enterprise to dock with the giant space stations as well as to avoid klingon torpedoes! Has shields, galactic memory readout, damage reports, long range sensors, etc! Has 3 levels for beginning, average, or expert players! ★ **INVASION WORG** — Time: 3099, Place: Earth's Solar System Mission: As general of Earth's forces, your job is to stop the Worg invasion and destroy their outposts on Mars, Venus, Saturn, Neptune, etc! Earth's Forces: Androids — Space Fighters — Lazer Cannon — Neutrino Blasters! Worg Forces: Robots — Saucers — Disintegrators — Proton Destroyers! Multi level game lets you advance to a more complicated game as you get better! ★ **STAR WARS** — Manuever your space fighter deep into the nucleus of the Death Star! Drop your bomb, then escape via the only exit. This graphics game is really fun! May the Force be with you! ★ **SPACE TARGET** — Shoot at enemy Ships with your missiles. If they eject in a parachute, capture them — or if you're cruel, destroy them! Full graphics, real time game! ★ **SAUCERS** — This fast action graphics game has a time limit! Can you be the commander to win the distinguished cross! Requires split second timing to win! Watch out!

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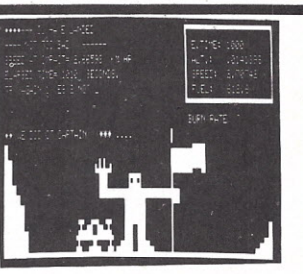
PACKAGE TWO INCLUDES: CHECKERS 2.1 — Finally! A checkers program that will challenge everyone! Expert as well as amateur! Use 3-ply tree search to find best possible move. Picks randomly between equal moves to assure you of never having identical games. ★ **POKER FACE** — The computer uses psychology as well as logic to try and beat you at poker. Cards are displayed using TRS-80's full graphics. Computer raises, calls, and sometimes even folds! Great practice for your Saturday night poker match! (Plays 5 card draw). ★ **PSYCHIC** — Tell the computer a little about yourself and he'll predict things about you, you won't believe! A real mind bender! Great amusement for parties. ★ **TANGLE MANIA** — Try and force your opponent into an immobile position. But watch out, they're doing the same to you! This graphics game is for 2 people and has been used to end stupid arguments. (And occasionally starts them!) ★ **WORD SCRAMBLE** — This game is for two or more people. One person inputs a word to the computer while the others look away. The computer scrambles the word, then keeps track of wrong guesses.

ONLY $12.95



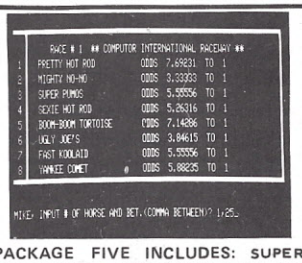
PACKAGE THREE INCLUDES: POETRY — This program lets you choose the subject as well as the mood of the poem you want. You give TRS-80 certain nouns or names, then the mood, and it does the rest! It has a 1000-word + vocabulary of nouns, verbs, adjectives and adverbs! ★ **ELECTRIC ARTIST** — Manual: draw, erase, move as well as, Auto: draw, erase and move. Uses graphics bits not bytes. Saves drawing on tape or disk! ★ **GALACTIC BATTLE** — The Swineus enemy have long range phasers but cannot travel at warp speed! You can, but only have short range phasers! Can you blitzkrieg the enemy without getting destroyed! Full graphics — real time! ★ **WORD MANIA** — Can you guess the computer's words using your human intuitive and logical abilities? You'll need to, to beat the computer! ★ **AIR COMMAND** — Battle the Kamikaze pilots. Requires split second timing. This is a FAST action arcade game.

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HARDWARE → TRS-80 ← HARDWARE

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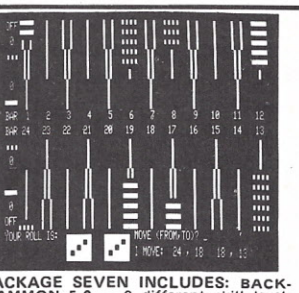
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MICRO-BEEP make games more fun as well as provide useful sound output for professional applications!

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CIRCLE 11

Home Computing for the Retirement Years!

BY WILLIAM R. PARKS

In the not too distant future, the countless senior citizens centers across the land may add home computing to their list of regular scheduled activites. When home computers become more pervasive and their great entertainment qualities are realized by senior citizens as a group, you will see such an avalanche of orders for both hardware and software that perhaps some people will think personal computers were invented for senior citizens.

Why am I so interested in seeing such developments? There are many reasons. Let me list just a few. Many senior citizens are physically disabled but still wish to remain active. With the growing number of games being produced for home computers, there is no reason why even the most physically disabled person couldn't get the thrill and satisfaction of playing any or all of the popular sports to which the society is addicted. I've seen one simulated game that requires sportsmanlike skill to play. Imagine the thrill when a long disabled senior citizen once again resumes his skillful attention to football, baseball or hockey on CRT screens. I am not referring to the simple handheld types of simulated games, but to highly complex software for interactive play that truly requires talent and mental acuity to play. I am thinking about software that will drive big screen color and sound sporting games with high resolution graphics. Perhaps two players would plan "huddle" strategies against each other and battle out almost real-life football games on giant color monitors to the delight and cheers of their friends.

Software publishers take note. Most games on the market today pit a player against the program running on the computer. However, for social settings where groups of people would get involved, you will have to create game programs that are highly sophisticated and involve two, three or more players. Thus, the purpose of the computer program would be to monitor the human players, add color and sound animations, and govern the rules and strategies input by the players. I believe that this new type of software may well become the most sophisticated and popular software of tomorrow.

I am not knocking the traditional software — there will always be a need for human-against-computer games. In the context of senior citizens, the need becomes obvious. Imagine that a retired person, living alone, wants some stimulating interactive game play, but no one is around to provide that partnership. The home computer can come to the rescue with many hours of stimulating interactive play. I conjecture that soon our grandmothers will be on the phone comparing game strategies and even exchanging good software through modem acoustic couplers.

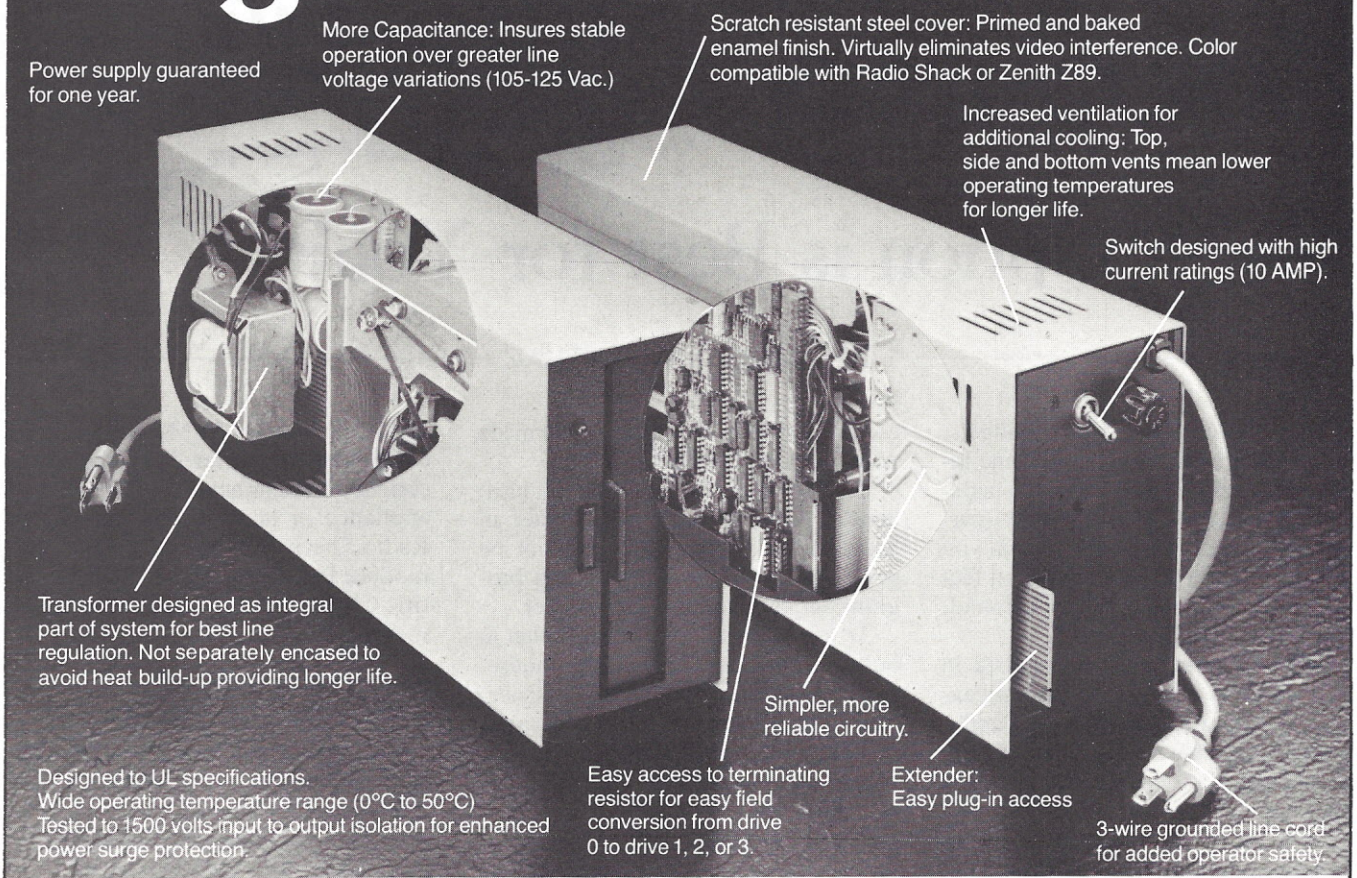
Imagine what will happen when this generation of programmers reaches retirement age. There are very few retired programmers — computer technology is too new. When this profession gets older and hundreds of thousands of programmers finally reach retirement age, we might see a renaissance in programming — not for business, but for the enjoyment of other senior citizen retirees. Perhaps, the main thrust of programming will be for entertainment purposes. Yes, business and educational programming are important, but entertainment may someday lead the list. Chess strategies can be as important to a retired person as some business program for data processing is to a businessman. We are more than attentive to the needs of businessmen — now let's put some time in for the retirees.

A message for computer store owners: Why not loan your best big screen color computer to the local senior citizens center for a few days or install it in the common room of the local senior citizens housing development. (I prefer to see "big" screen color computers because they dominate the situation better!) Teach more socially aggressive members how to load game programs and ask them to invite other senior members for interactive game play. I would suggest starting with the game "Othello," then moving up to something more challenging like chess. As a computer store owner, you might be interested in making a sale. Perhaps you could suggest that these people pool their funds and get one computer at first and maybe more later on. How about demonstrating the home computer to an entire group of senior citizens and offering to rent it on a rotating basis among the many apartment dwellers? This sales strategy might bring you the sale of many machines as individuals decide to purchase their own computers.

When the words "home computers" enter the vocabularies of our senior citizens, you will see a rapid growth in the industry. What you must realize is that many of the retired are among the most wealthy in our society. Many retired folk are in a position to invest in good home entertainment for their golden years. I can't think of a better thing to invest in than a home computer.

As a person who cherishes the aged in our society, I am concerned that there are many lonely retired persons. Television is not enough for them — it's too passive. I would feel better knowing that lonely people have some form of interactive conversation, at least for part of the day. I would feel better knowing that such persons who live alone would be able to relate to an interactive entertainment that would keep their minds active and even help them communicate with the outside world using, what I mentioned before, acoustic couplers. Game playing and educational computer programs would fill the gap that television can't fill — the ability to respond rather than just passively observe.

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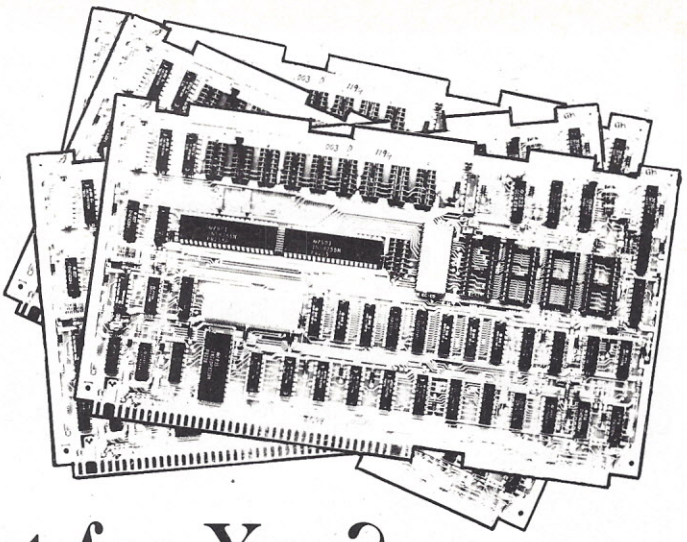
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CIRCLE 12

Single-Board vs. Personal Computers



Which Option is Best for You?

BY LANCE A. LEVENTHAL

For those with limited budgets, there are two ways to become involved in microcomputers — single-board computers and appliance (personal or home) computers. Which you choose will depend on a number of factors including budget, background, interests and applications.

I will describe what is included in these systems and discuss their advantages and disadvantages, typical applications and future trends. Finally, I will present criteria for selecting one or the other type.

First, let's adhere to the following guidelines in describing these options:

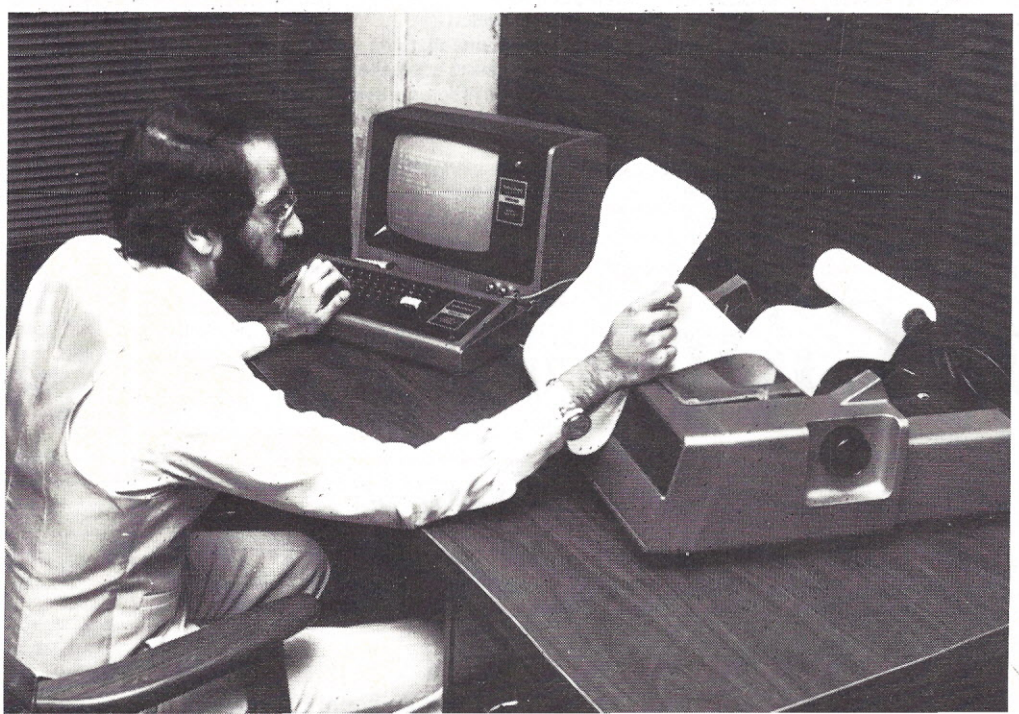
1) Expenditures above $1000 will be considered large; those under $1000 will be considered small. Purchases in the intermediate range will be considered reasonable, but hardly to be made without careful consideration.

2) You will be assumed to have done a little programming, either in Basic or in Fortran, but will not be presumed to be either an expert programmer or a digital logic designer.

3) I assume that you do not plan to build a computer-controlled house, lawn sprinkler system, robot or spaceship. I will concentrate on computers that can provide reasonable experience at low cost and perhaps do a few practical things as well.

The most reasonable low-cost approaches are to purchase either a single-board computer (or evaluation kit) or an appliance (or home) computer. Typical single-board computers (SBCs) are the MOS Technology KIM, Rockwell AIM, Synertek SYM and various evaluation kits offered by the semiconductor manufacturers. Examples of appliance or home computers are the Radio Shack TRS-80, Apple II, Commodore Pet, Compucolor, Ohio Scientific Challenger II, Bally, Texas Instruments and Atari.

Radio Shack TRS-80 personal computer.



Characteristics of SBCs and Appliance Computers

A single-board computer or evaluation kit consists of an unpackaged circuit board with various electronic components and interfaces. Typically included are:

- a microprocessor (one-chip central processing unit)
- some read only memory containing a monitor that allows you to perform simple functions such as examining and changing memory, examining registers and executing programs
- some read/write memory (RAM) in which you can place data and programs and which can be used for other temporary storage
- input/output ports to which peripherals can be attached

Almost all single-board computers contain some further options, depending on the applications for which they are intended. Popular options on systems like the Synertek SYM-1 include:

- audio cassette interface to provide cheap mass storage via an ordinary cassette recorder
- video interface to allow attachment of a television set
- on-board peripherals such as a keyboard (often calculator-like), seven-segment displays, alphanumerical displays or a printer

- RS-232 or current-loop interface for a terminal

Obviously the more that is included, the higher the price will be. Single-board computers without on-board peripherals will be the cheapest but require a terminal to operate. Other factors that increase the introductory price are more memory and input/output ports, a larger monitor with more features and more extensive interfaces.

A personal or appliance computer consists of a packaged system. Typically included are:

- CPU board
- 4K to 16K of read/write memory
- large amount of read only memory that may contain a high-level language (usually Basic) as well as a monitor and other programs
- typewriter-like keyboard
- television set (video monitor) or an interface for one
- audio cassette recorder or an interface for one
- power supply
- case
- some graphics or line and figure drawing capability

Options that may be included are color graphics, a floppy disk, communications interfaces and slots for more memory or other interfaces.

Clearly the appliance computers have more capabilities than the single-board computers and, of course, higher prices. Single-board computers are available for as little as $100 although $200 to $400 is a typical price range. Appliance computers usually cost $500 to $1500, with most useful systems being closer to the higher price than the lower one.

Advantages and Disadvantages

The advantages of the single-board computers include: low initial cost; ease of attachment to equipment for control purposes; small size and great flexibility in use; little separation of user from underlying hardware; and portability. Single-board computers are well-suited to simple control applications like test systems, laboratory instrumentation or experiment monitoring. The units do not require any computer background. Manuals are suited to those with digital electronics background and applications.

The disadvantages of single-board computers lie in their limitations such as in the area of expandability. Expansion may be quite expensive since more power, a new housing, connectors, cables and other accessories must be added. There is also a situation of limited software and hardware support. A simple assembler and Basic are the only software usually available. Additional peripherals require considerable interfacing if they are at all complex. Lack of adequate peripherals and software for writing and debugging anything other than short programs may also be encountered with single-board computers.

Usually, there is limited documentation for anything other than the most popular variations (such as the KIM, SYM and AIM) or computers specifically designed for coursework (such as the E and L Mini-Micro Designer or Heathkit ET-3400). SBCs generally require a background and interest in digital electronics.

One problem for those who want to use a single-board computer to gain experience is that the most popular single-board computers (KIM, AIM and SYM) are based on the 6502 microprocessor, which is not widely used in industry. On the other hand, kits that utilize the popular Intel processors often have rather little support. The 6502 microprocessor and the single-board computers based on it are supported by numerous suppliers, books and even magazines. (MICRO, P.O. Box 6502, Chelmsford, MA 01824 is a magazine dedicated entirely to 6502-based single-board and appliance computers.)

The advantages of personal (or appliance) computers include wide availability through radio/electronics stores, computer stores and mail order suppliers; extensive software support, including operating systems, languages like Basic, Pascal, Fortran and Cobol, editors, assemblers and numerous applications programs and games; and expandability since a case and a simple bus structure is provided. The Apple with its standard case and empty slots for additional boards is easier to expand than either the TRS-80 or Pet, although it is somewhat more expensive initially.

The appliance computer field also has reasonable documentation. For the rank beginner, Radio Shack's Level I User's Manual is an ideal way to get started. For those who are more advanced, there are numerous books and magazines for the popular personal computers.

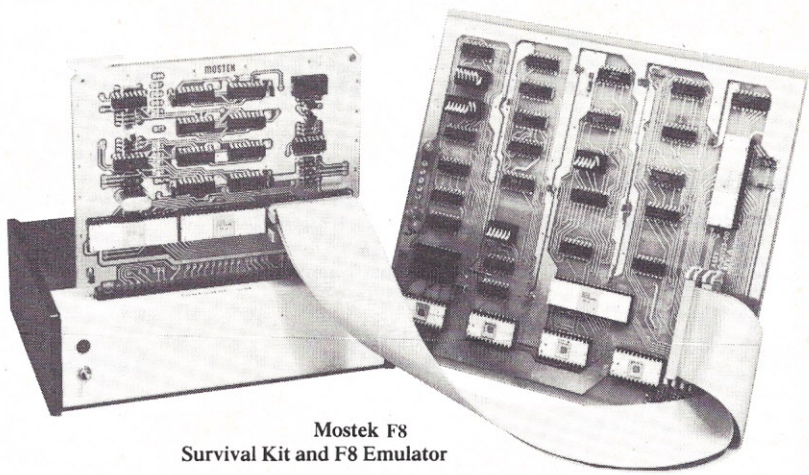
Extensive peripherals can be added easily to a system. The large market for personal computers has spawned numerous suppliers who provide printers, disks, voice I/O units, plotters, digitizers, analog input/output systems and other devices at reasonable cost. Obviously, you are far ahead with the popular brands such as the TRS-80 and Apple II.

Local service is another advantage of personal computers. Clearly Radio Shack has a big lead here with its numerous local stores. For the most part, the computers themselves are usually quite reliable; the largest problems arise from the erratic behavior of standard audio cassette recorders.

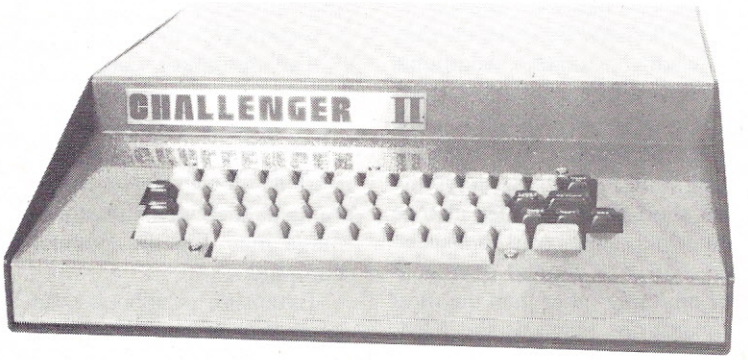
Finally, personal computers require no understanding of digital electronics.

Appliance computers have disadvantages as well. Electrical design and documentation are fair at best. Computers can behave erratically if there is noise on the power lines and the quality of many products leaves much to be desired.

Lack of reliable suppliers for hardware or software can be another problem. Most of the companies in the personal computer business are new (at least at building computers, if not completely). In particular, the quality of software from manufacturers and independent suppliers alike is extremely variable; there are some good suppliers, but it is difficult for the newcomer to identify them.



Mostek F8
Survival Kit and F8 Emulator



Ohio Scientific Challenger IIP personal computer.

The last major disadvantage of personal computers is a lack of standard or even well-defined buses. Making electrical connections to control equipment is often unnecessarily difficult.

The same problem with respect to useful experience occurs with appliance computers as with single-board computers. Two of the most popular appliance computers (Apple II and Pet) are based on the 6502 microprocessor; this makes little difference to those who program in Basic, Pascal or some other high-level language, but is a drawback for those who want to use their knowledge to build controllers in an industrial world that is dominated by 8080, Z-80, and 6800 microprocessors.

Typical Applications

How can these computers be used? The single-board computers are useful for learning microcomputer electronics or assembly language programming; controlling laboratory instruments or experiments; prototyping microcomputer-based equipment; providing a low-cost remote terminal for data collection; controlling data logging and acquisition; monitoring test equipment; and performing simple electrical tests.

Appliance computers are useful for a wide variety of computer tasks, including serving as a video calculator for engineering and business problems, or as a learning station for high-level language (Basic, Pascal or Fortran) programming; word processing; computer-aided instruction; video games; financial recordkeeping; handling lists of addresses, names, contributors, suppliers, etc.; investment manage-

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Norcross, GA 30091
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Aurora, OH 44202
(216) 562-3101
Circle 220

Radio Shack
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Lubbock, TX 79408
Circle 222



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ment; low-cost development system; and acting like an intelligent terminal for time-sharing systems.

Future Trends

We can expect at most minor changes in single-board computers. There will be new CPUs, larger memories and more ROM-based software. The total volume in the market is not large enough to justify major expenditures on either hardware or software. Costs appear to be rising somewhat because of general inflation but no major changes are occurring.

Appliance computers, on the other hand, are a large enough market to encourage the development of numerous improvements. We are already seeing a much higher quality of software from sources like MicroSoft and Digital Research. Applications software, particularly in the business area, is beginning to be widely available. Software publishers, who produce mass-marketed programs in the way that other publishers produce books and records, are now organizing distribution networks. The appliance computer will rapidly move from being an interesting toy to being a general computer system capable of a variety of applications, as more and better software and hardware support appears.

Selecting a Computer

In general, if you want to build a controller, I strongly recommend the purchase of a single-board computer. You can get at the input/output far more easily than you can on an appliance computer and you may even be able to use the single-board computer as a prototype of the final produce. A particular nice configuration is the Rockwell AIM-65, since it has full typewriter-style keyboard, a thermal printer, an on-board alphanumeric display (20 characters) and a monitor that allows mnemonic entries and provides reasonable debugging facilities. The AIM-65 also has room for on-board ROM and PROM and for an optional assembler and Basic interpreter. Its only real disadvantages are its dependence on the 6502 microprocessor and its relatively limited support. A more strictly learning-oriented system with excellent documentation is the Heath ET-3400, based on the Motorola 6800 microprocessor.

If you want to do more than just build a controller, I recommend the appliance computer. External input/output is more difficult but there is far more documentation and support. Besides, you can always justify its purchase on the basis of educational applications, home accounting or game playing. Of the most popular variations, the Radio Shack TRS-80 is the least expensive, best supported and most widely sold and serviced. The Apple II, on the other hand, is much easier to expand and is much better packaged. Either makes a great Christmas present, particularly if you buy it for yourself as a tax-deductible development system.

One warning note: don't try to go too far with either type of computer. There is no sense building a $10,000 system out of single-board or appliance computer. They simply do not provide a sound enough base electrically or mechanically, and their software is also far from professional in quality. You can easily end up with a jerry-build, awkward, low-quality system that costs just as much as one that has been built and integrated professionally. Set yourself a goal in terms of how far you will expand your system and hold to it. □

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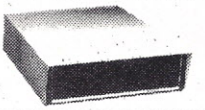
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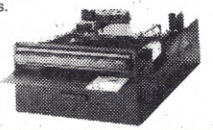
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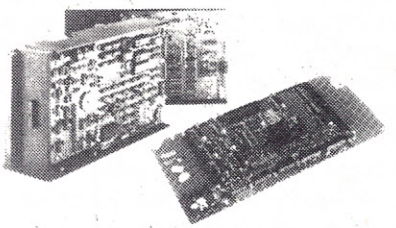
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CIRCLE 14

Inventory Simulation

BY ADRIAN WOODS

Two questions businesses frequently face are "When should a particular component, product or raw material be reordered?" and "In what quantity?" In a previous article on "Economic Order Quantity" (November 1979 *PC*), these questions were answered by using one of the four EOQ models: classical EOQ; EOQ with lead times; EOQ with back orders; and EOQ with stochastic demand. Each of these models refers to common business situations. The last one introduces a random element for demand, giving a reasonable solution to many real world stock control problems.

This program extends the idea of uncertainty, allowing examination of situations where neither demand nor delivery time is known. The program lets you specify a range of reorder points and reorder quantities and calculates the average daily costs of each combination of reorder level and reorder quantity.

You can use the program in several ways. First, it can indicate whether your present reorder level and quantity gives you the lowest average cost combination. Second, you may use the program in situations where you do not know the optimum combination and you wish to try several alternatives. You can also monitor the sensitivity of a particular inventory item in terms of holding costs, shortage costs or ordering costs by examining "average cost" variance following changes in those categories.

On running the program, you are required to enter certain information the computer needs to perform the simulation.

The first of these inputs are data concerning the distribution of demand. For example, over the last several months you have observed the daily demand for an inventory item to be as listed in Figure 1. The numbers indicate that you distributed between 1 and 5 items on 10 of your 95 days worth of records; between 6 and 10 items for 17 of those days; between 16 and 20 items for 23 of those days; and so on.

The program first prompts you for the number of class intervals you have set for the inventory item in question. In the example, there are 7 class intervals (1-5, 6-10, 11-15, 16-20, 21-25, 26-30, 31-35). The program then requests the midpoint for each interval and the cumulative frequency associated with that class interval. The first midpoint would be 3, with 10 the cumulative frequency. For the second class interval, 8 is the midpoint and 27 the cumulative frequency. Enter the midpoint and cumulative frequency for each class interval.

Your next inputs relate to the distribution of time for orders to arrive. To continue the example, let's say that the time taken to receive your orders of the inventory item was distributed as shown in Figure 2. Two of your orders took between 1 and 3 days to arrive; five orders took between 4 and 6 days; 11 orders arrived in from 7 to 9 days; and so on.

The inputting of this information is similar to the operation you performed for indicating distribution of demand. First, you enter the number of class intervals (5), then each class interval midpoint and its associated cumulative frequency.

You next enter the holding cost per

Program Listing

```
 100 REM STORES STIMULATION PROGRAM
 200 REM ********************
 300 REM DIMENSION ARRAYS
 400 DIM D(20),D1(20),T(20),T1(20)
 500 REM ARRAY D MIDPONTS OF DEMAND:D1 CUMALATIVE FREQUENCY FOR DEMAND
 600 REM ARRAY T MIDPOINTS FOR LEAD TIME:T1 CUMALATIVE FREQUENCY FOR LEAD TIME
 700 GOSUB15300
 900 PRINT"[HOM][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUR][CUR][CUR][CUR][RVS]STOR
ES SIMULATION PROGRAM"
1000 FOR W1 =1 TO 200:NEXT W1
1100 REM INPUT DATA ********************
1200 GOSUB 14400:REM GRAPHICS SUBROUNTINE FOR INPUTS
1300 PRINT"[CLR][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUR]PLE
ASE INPUT NUMBER OF CLASS INTERVALS[CUR] FOR DEMAND[CUD][CUD][CUD][CUR][CUR]"
1400 INPUT D:REM DEMAND CLASS INTERVALS
1500 GOSUB 14400
1700 PRINT"PLEASE INPUT MIDPOINT OF CLASS INTERVAL AND ASSOCIATED CUMULATIVE"
1800 PRINT"FREQUENCY[CUD][CUD][CUD][CUD][CUD]"
1900 FOR A=1 TO D
2000 INPUT D(A),D1(A):REM MID POINTS AND CUMULATIVE FREQUUENCY
2100 NEXT A
2200 GOSUB14400
2300 PRINT"PLEASE INPUT NUMBER OF CLASS              INTERVALS FOR THE LEAD TIME"

2400 PRINT"[CUD][CUD][CUD][CUD][CUD]"
2500 INPUT T:REM  NUMBER OF CLASS INTERVALS FOR LEAD TIME
2600 GOSUB 14400
2800 PRINT"PLEASE INPUT MIDPOINTS OF CLASS INTERVALS AND THEIR ASSOCIATED";
2900 PRINT" CUMULATIVE FREQUENCY"
3000 PRINT"[CUD][CUD][CUD][CUD][CUD]"
3100 REM READ IN LEAD TIME DISTRIBUTION
3200 FOR A=1 TO T
3300 INPUT T(A),T1(A):REM MID POINTS AND CUMALATIVE FREQUENCY FOR LEAD TIME
3400 NEXTA
3500 FOR A=1 TOD:D1(A)=D1(A)/D1(D):NEXTA
3600 FOR A=1 TOT:T1(A)=T1(A)/T1(T):NEXTA
3700 GOSUB14400
3800 PRINT"PLEASE INPUT HOLDING COST PER DAY":INPUTH:REM HOLDING COST
4000 GOSUB14400
4100 PRINT"PLEASE INPUT ORDERING COST PERORDER":INPUTO
4300 GOSUB14400
4400 PRINT"PLEASE INPUT SHORTAGE COST ":INPUTS:REM SHORTAGE COST
```

continued

```
4600 GOSUB14400
4700 PRINT"PLEASE INPUT FIRST REORDER POINT":INPUTR:REM FIRST REORDER POINT
4900 GOSUB14400
5000 PRINT"PLEASE INPUT LAST REORDER POINT":INPUTR1:REM LAST REORDER POINT
5200 GOSUB14400
5300 PRINT"PLEASE INPUT REORDER STEP":INPUTR2:REM REORDER STEP
5500 GOSUB14400
5600 PRINT"PLEASE INPUT FIRST REORDER QUANTITY":INPUTQ
5700 REM Q=FIRST REORDER QUANTITY
5900 GOSUB14400
6000 PRINT"PLEASE INPUT LAST REORDER QUANTITY":INPUTQ1
6100 REM Q1= LAST REORDER QUANTITY
6300 GOSUB14400
6400 PRINT"PLEASE INPUT REORDER STEP":INPUTQ2
6500 REM Q2= REORDER STEP
6700 GOSUB14400
6800 PRINT"PLEASE INPUT STARTING INVENTORY":INPUTV:REM STARTING INVENTORY
7000 GOSUB14400
7100 PRINT"PLEASE INPUT NUMBER OF DAYS":INPUTN:REM NUMBER OF DAYS

7300 PRINT"TO SUPPRESS DAILY ANALYSIS INPUT 1 ELSE INPUT ANY NUMBER"
7400 INPUT F2:REM FLAG FOR DAILY ANALYSIS
7500 IF F2=1 GOTO 7700
7600 PRINT"[CLR]INVENTORY","ORDER","DEMAND","DAY"
7700 REM ££££££££££££££££££££££££
7800 REM START STIMULATION
7900 FOR Z=RTOR1STEPR2
8000 FORY=QTOQ1STEPQ2
8100 J=0:K=0:I=V:REM SET DAYS AND COST TO ZERO:SET INITIALISE INVENTORY
8200 F1=0:REM SET FLAG FOR ORDER 0 NO OUTSTANDING ORDER:1 WAITING FOR ORDER
8300 FORJ=1TON:REM START CIRCLE AND STEP THROUGH
8400 GOSUB 11300:REM SUBROUNTINE FOR DEMAND
8500 GOSUB 12000:REM SUBROUTINE TO CHECK IF ORDER IS ARRIVING TODAY
8600 I=I+O2-DE:REM INCREASE INVENTORY BYORDER AND DECREASE BY TODAY'S DEMAND
8700 IF F2=1 GOTO 9000:REM CHECK DAILY ANALYSIS FLAG
8800 PRINT"[CUD][CUD][CUD]";I,O2,DE,J
8900 FOR W1=1 TO 200:NEXT W1
9000 I1=I1+I
9100 O2=0:REM SET ORDER BACK TO ZERO
9200 IF I<R THEN GOSUB 12400:REM CHECK TO SEE IF REORDER LEVEL REACHED
9300 IF I<0 THEN GOSUB 13500:REM CHECK THAT INVENTORY IS POSITIVE
9400 GOSUB 13900: REM UPDATE HOLDING COSTS
9500 NEXTJ
9600 REM NUMBER OF DAYS FOR STIMULATION REACHED
9700 HI=HI/N:O1=O1/N:S1=S1/N:REM AVERAGE COST COMPONENTS
9800 T2=HI+S1+O1:REM AVERAGE COST
9900 HI=0:S1=0:O1=0:REM RESET COST COMPONENTS
10000 FORU=1TO5:PRINT"":NEXTU
10100 PRINT"[CLR][CUD][CUD][CUD][CUD]REORDER LEVEL",Z
10200 PRINT"REORDER QUANTITY",Y
10300 PRINT"AVERAGE COST",T2
10400 PRINT"FINAL INVENTORY LEVEL",I
10500 PRINT"AVERAGE DAILY INVENTORY";I1/N
10600 I1=0:REM RESET INVENTORY
10610 PRINT"PLEASE INPUT ANY CHARACTER TO CONTINUE"
10620 GETA$:IF A$="" THEN 10620
10700 NEXTY
10800 NEXTZ
10900 PRINT"[CLR][CUD][CUD][CUD][CUD][CUD][CUR][CUR][CUR][CUR][CUR]END OF THIS
      STIMULATION"
11000 PRINT"£££"
11100 GOTO16000
11200 REM DEMAND SUBROUTINE*************
11300 X=RND(1):REM RANDOMISE FOR DEMAND

11400 FOR A=1 TO D:IF D1(A))X THEN GOTO 11600
11500 NEXT A
11600 DE=D(A):REM DEMAND SET TO DE
11700 RETURN
11800 REM *****************************
11900 REM SUBROUTINE TO CHECK IF ORDER IS ARRIVING TODAY***************
12000 IF J=K THEN O2=Y:F1=0: REM GET ORDER AND RESET REORDER FLAG
12100 RETURN
12200 REM **********************
12300 REM REORDER SUBROUTINE************
12400 IF F1=1 THEN 13200:REM CHECK TO SEE IF ORDER IS OUTSTANDING
12500 X=RND(2):REM RANDOMISE
12600 REM FIND HOW MANY DAYS FOR ORDER TO ARRIVE
12700 FOR A=1 TO T:IF T1(A))X THEN GOTO 12900
12800 NEXT A
12900 K=J+T(A):REM DAY FOR ORDER TO ARRIVE
13000 F1=1:REM SET ORDER FLAG TO ONE
13100 O1=O1+O:REM INCREASE ORDER COST TOTAL
13200 RETURN
13300 REM ********************
13400 REM SUBROUTINE FOR SHORTAGE COSTS
13500 S1=S1-(S*I):REM INCREASE TOTAL SHORTAGE COSTS
13600 RETURN
13700 REM **********************
13800 REM HOLDING COSTS SUBROUTINE*************
13900 IF I<0 GOTO 14100:REM CHECK TO SEE IF INVENTORY IS POSITIVE
14000 HI=HI+(I*H)
14100 RETURN
14200 REM ******GRAPHICS*****************
14300 REM GRAPH HICS FOR INPUT
14400 PRINT"[CLR][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUR]"
14500 RETURN
15300 PRINT"[CLR]&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&"
15400 PRINT"[CUU]";
15500 FOR G1=1 TO 15:PRINT"&[CUL]":NEXTG1
15600 PRINT"&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&";
15700 PRINT"[CUL][CUU]&"
15800 FOR G1=1 TO18:PRINT"[CUL][CUU]&";:NEXTG1
15900 RETURN
16000 END
```

Demand	Frequency	Cumulative Frequency
1 - 5	10	10
6 - 10	17	27
11 - 15	23	50
16 - 20	21	71
21 - 25	14	85
26 - 30	8	93
31 - 35	2	95

Figure 1. Inventory Demand

Days	Frequency	Cumulative Frequency
1 - 3	2	2
4 - 6	5	7
7 - 9	11	18
10 - 12	3	21
13 and above	1	22

Figure 2. Inventory Delivery

day; the ordering cost per order; the shortage cost; reorder range and step (for instance, you might want to investigate the effects of a reorder level that goes from 20 to 100 in steps of 10); reorder quantity range and step (say, from 40 items to 140 items in steps of 20 items); starting inventory; and number of days that you wish the program to simulate. The longer you let the simulation run, the better the results.

The last requested input is a flag. Entering a "1" suppresses the daily mode and you will receive only a summary table indicating reorder level, reorder quantity, average cost per day, final inventory level and average inventory level for the period of the simulation. If you input any number except "1," you receive daily inventory output indicating analysis of daily inventory, order quantity and status, demand for the item and the day of the simulation; you also receive the output summary mentioned above.

Sample Run 1 utilizes the daily analysis function of the simulation. From this run the daily pattern of demand and orders can be clearly identified. At the end of the run, average cost and average inventory is given and

this, along with the daily analysis, gives a picture of the underlying process. Although the optimum combination of reorder level and quantity is not investigated, the run demonstrates that given the existing parameters for demand, lead time and costs, nothing is seriously wrong with the reorder level or quantity.

Sample Run 2 analyzes several combinations of reorder level and quantity to point the way towards an optimum combination. Only part of the run is shown.

Two points emerge from this run. First, low reorder levels and quantities lead to large negative stocks. This situation is rectified in Sample Run 3 by increasing both reorder level and reorder quantity. Sample Run 3 indicates that the new parameters are more suitable than the previous ones.

In Sample 4, the low shortage cost is changed to examine the impact of this on average cost.

The program, written for a Commodore Pet, uses some of the Pet's special graphics in output formatting. The program can be modified to give line printer output but screen output is feasible for running through many combinations without generating pages of output. □

Sample Run 1

```
PLEASE INPUT NUMBER OF CLASS
INTERVALS  FOR DEMAND 7

PLEASE INPUT MIDPOINT OF CLASS
INTERVAL AND ASSOCIATED
CUMULATIVE FREQUENCY

 60             7
 80             21
 100             39
 120             68
 140             84
 160             95
 180             100

PLEASE INPUT NUMBER OF CLASS
INTERVALS FOR THE LEAD TIME
 5
PLEASE INPUT MIDPOINTS OF CLASS
INTERVALS AND THEIR ASSOCIATED
CUMULATIVE FREQUENCY

 1              6
 2              26
 3              66
 4              86
 5              100

PLEASE INPUT HOLDING COST PER DAY
 1

PLEASE INPUT ORDERING COST PERORDER
 20

PLEASE INPUT SHORTAGE COST
 5

PLEASE INPUT FIRST REORDER POINT
 700

PLEASE INPUT LAST REORDER POINT
 701

PLEASE INPUT REORDER STEP
 100

PLEASE INPUT FIRST REORDER QUANTITY
 700

PLEASE INPUT LAST REORDER QUANTITY
 701

PLEASE INPUT REORDER STEP
 100

PLEASE INPUT STARTING INVENTORY
 500

PLEASE INPUT NUMBER OF DAYS
 100
TO SUPPRESS DAILY ANALYSIS INPUT 1
ELSE INPUT ANY NUMBER 2

INVENTORY  ORDER    DEMAND      DAY
 360         0        140        1
 1000        700      60         2
 920         0        80         3
 820         0        100        4
 720         0        100        5
 580         0        140        6
 400         0        180        7
 260         0        140        8
 820         700      140        9
 720         0        100        10
 620         0        100        11
 500         0        120        12
 1140        700      60         13
 880         700      120        93
 740         0        140        94
 600         0        140        95
 480         0        120        96
 340         0        140        97
 240         0        100        98
 120         0        120        99
 740         700      80         100

REORDER LEVEL              700
REORDER QUANTITY             700
AVERAGE COST             629
FINAL INVENTORY LEVEL                740
AVERAGE DAILY INVENTORY 625.6
     END OF THIS STIMULATION
###

READY.
```

Sample Run 2

```
PLEASE INPUT NUMBER OF CLASS
INTERVALS  FOR DEMAND
 7
PLEASE INPUT MIDPOINT OF CLASS
INTERVAL AND ASSOCIATED
CUMULATIVE FREQUENCY

 3              10
 8              27
 13              50
 18              71
 23              85
 28              93
 33              95

PLEASE INPUT NUMBER OF CLASS
INTERVALS FOR THE LEAD TIME
 5
PLEASE INPUT MIDPOINTS OF CLASS
INTERVALS AND THEIR ASSOCIATED
CUMULATIVE FREQUENCY

 2              2
 5              7
 8              18
 11              21
 14              22

PLEASE INPUT HOLDING COST PER DAY
 .2

PLEASE INPUT ORDERING COST PERORDER
 10

PLEASE INPUT SHORTAGE COST
 .1

PLEASE INPUT FIRST REORDER POINT
 20

PLEASE INPUT LAST REORDER POINT
 100

PLEASE INPUT REORDER STEP
 10

PLEASE INPUT FIRST REORDER QUANTITY
 40

PLEASE INPUT LAST REORDER QUANTITY
 140

PLEASE INPUT REORDER STEP
 20

PLEASE INPUT STARTING INVENTORY
 50

PLEASE INPUT NUMBER OF DAYS
 1000
TO SUPPRESS DAILY ANALYSIS INPUT 1
ELSE INPUT ANY NUMBER 1

REORDER LEVEL              20
REORDER QUANTITY             40
AVERAGE COST             502.4673
FINAL INVENTORY LEVEL              -9970
AVERAGE DAILY INVENTORY-5010.895

REORDER LEVEL              20
REORDER QUANTITY             60
AVERAGE COST             377.2553
FINAL INVENTORY LEVEL              -7285
AVERAGE DAILY INVENTORY-3759.06

REORDER LEVEL              20
REORDER QUANTITY             80
AVERAGE COST             253.023
FINAL INVENTORY LEVEL                -4995
AVERAGE DAILY INVENTORY-2516.74

REORDER LEVEL              20
REORDER QUANTITY             100
AVERAGE COST             143.4786
FINAL INVENTORY LEVEL              -2345
AVERAGE DAILY INVENTORY-1421.555

READY.
```

Sample Run 3

```
PLEASE INPUT NUMBER OF CLASS
INTERVALS  FOR DEMAND
 7
PLEASE INPUT MIDPOINT OF CLASS
INTERVAL AND ASSOCIATED CUMULATIVE
FREQUENCY
   3            10
   8            27
   13            50
   18            71
   23            85
   28            93
   33            95
PLEASE INPUT NUMBER OF CLASS
INTERVALS FOR THE LEAD TIME
 5
PLEASE INPUT MIDPOINTS OF CLASS
INTERVALS AND THEIR ASSOCIATED
CUMULATIVE FREQUENCY
 2              2
 5              7
 8              18
 11              21
 14              22

PLEASE INPUT HOLDING COST PER DAY
 .2

PLEASE INPUT ORDERING COST PERORDER
 10

PLEASE INPUT SHORTAGE COST
 .1
```

continued

```
PLEASE INPUT FIRST REORDER POINT
 60

PLEASE INPUT LAST REORDER POINT
 160

PLEASE INPUT REORDER STEP
 20

PLEASE INPUT FIRST REORDER QUANTITY
 140

PLEASE INPUT LAST REORDER QUANTITY
 240

PLEASE INPUT REORDER STEP
 20

PLEASE INPUT STARTING INVENTORY
 50

PLEASE INPUT NUMBER OF DAYS
 1000
TO SUPPRESS DAILY ANALYSIS INPUT 1
ELSE INPUT ANY NUMBER 1

REORDER LEVEL              60
REORDER QUANTITY          140
AVERAGE COST          9.45820001
FINAL INVENTORY LEVEL        -35
AVERAGE DAILY INVENTORY-8.23

REORDER LEVEL              60
REORDER QUANTITY          160
AVERAGE COST          10.8701
FINAL INVENTORY LEVEL         40
AVERAGE DAILY INVENTORY 29.145

REORDER LEVEL              60
REORDER QUANTITY          180
AVERAGE COST          12.4669
FINAL INVENTORY LEVEL         30
AVERAGE DAILY INVENTORY 32.44

REORDER LEVEL              60
REORDER QUANTITY          200
AVERAGE COST          13.8946
FINAL INVENTORY LEVEL         45
AVERAGE DAILY INVENTORY 45.65

REORDER LEVEL              60
REORDER QUANTITY          220
AVERAGE COST          15.3117
FINAL INVENTORY LEVEL        165
AVERAGE DAILY INVENTORY 56.72

REORDER LEVEL              60
REORDER QUANTITY          240
AVERAGE COST          17.2519
FINAL INVENTORY LEVEL        -10
AVERAGE DAILY INVENTORY 68.26
```

Sample Run 4

```
PLEASE INPUT NUMBER OF CLASS
INTERVALS  FOR DEMAND
 7
PLEASE INPUT MIDPOINT OF CLASS
INTERVAL AND ASSOCIATED
CUMULATIVE FREQUENCY
 3            10
 8            27
 13            50
 18            71
 23            85
 28            93
 33            95

PLEASE INPUT NUMBER OF CLASS
INTERVALS FOR THE LEAD TIME
 5
PLEASE INPUT MIDPOINTS OF CLASS
INTERVALS AND THEIR ASSOCIATED
CUMULATIVE FREQUENCY

 2            2
 5            7
 8            18
 11            21
 14            22

PLEASE INPUT HOLDING COST PER DAY
 .2

PLEASE INPUT ORDERING COST PERORDER
 10

PLEASE INPUT SHORTAGE COST
 .5

PLEASE INPUT FIRST REORDER POINT
 20

PLEASE INPUT LAST REORDER POINT
 100

PLEASE INPUT REORDER STEP
 40

PLEASE INPUT FIRST REORDER QUANTITY
 100

PLEASE INPUT LAST REORDER QUANTITY
 240

PLEASE INPUT REORDER STEP
 20

PLEASE INPUT STARTING INVENTORY
 50

PLEASE INPUT NUMBER OF DAYS
 1000
TO SUPPRESS DAILY ANALYSIS INPUT 1
ELSE INPUT ANY NUMBER 1

REORDER LEVEL              20
REORDER QUANTITY          100
AVERAGE COST          659.8419
FINAL INVENTORY LEVEL      -2280
AVERAGE DAILY INVENTORY-1316.95

REORDER LEVEL              20
REORDER QUANTITY          120
AVERAGE COST          71.9625
FINAL INVENTORY LEVEL        -70
AVERAGE DAILY INVENTORY-140

REORDER LEVEL              20
REORDER QUANTITY          140
AVERAGE COST          25.0599
FINAL INVENTORY LEVEL         70
AVERAGE DAILY INVENTORY-33.915

REORDER LEVEL              20
REORDER QUANTITY          160
AVERAGE COST          20.84
FINAL INVENTORY LEVEL        -55
AVERAGE DAILY INVENTORY-14.7

REORDER LEVEL              20
REORDER QUANTITY          180
AVERAGE COST          24.8607
FINAL INVENTORY LEVEL        -50
AVERAGE DAILY INVENTORY-14.235

REORDER LEVEL              20
REORDER QUANTITY          200
AVERAGE COST          22.4773
FINAL INVENTORY LEVEL        -55
AVERAGE DAILY INVENTORY 2.965

REORDER LEVEL              20
REORDER QUANTITY          220
AVERAGE COST          21.5196
FINAL INVENTORY LEVEL        100
AVERAGE DAILY INVENTORY 25.39

REORDER LEVEL              20
REORDER QUANTITY          240
AVERAGE COST          23.3715
FINAL INVENTORY LEVEL        -30
AVERAGE DAILY INVENTORY 13.545

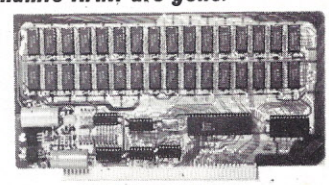
REORDER LEVEL              60
REORDER QUANTITY          100
AVERAGE COST          589.2444
FINAL INVENTORY LEVEL      -2560
AVERAGE DAILY INVENTORY-1175.465

REORDER LEVEL              60
REORDER QUANTITY          120
AVERAGE COST          74.9492001
FINAL INVENTORY LEVEL        -345
AVERAGE DAILY INVENTORY-140.945

REORDER LEVEL              60
REORDER QUANTITY          140
AVERAGE COST          40.3035
FINAL INVENTORY LEVEL        -15
AVERAGE DAILY INVENTORY-63.895

REORDER LEVEL              60
REORDER QUANTITY          160
AVERAGE COST          28.6588
FINAL INVENTORY LEVEL        -170
AVERAGE DAILY INVENTORY-34.65
```


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CIRCLE 15

GET AIM



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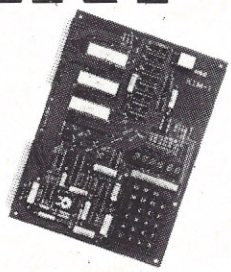
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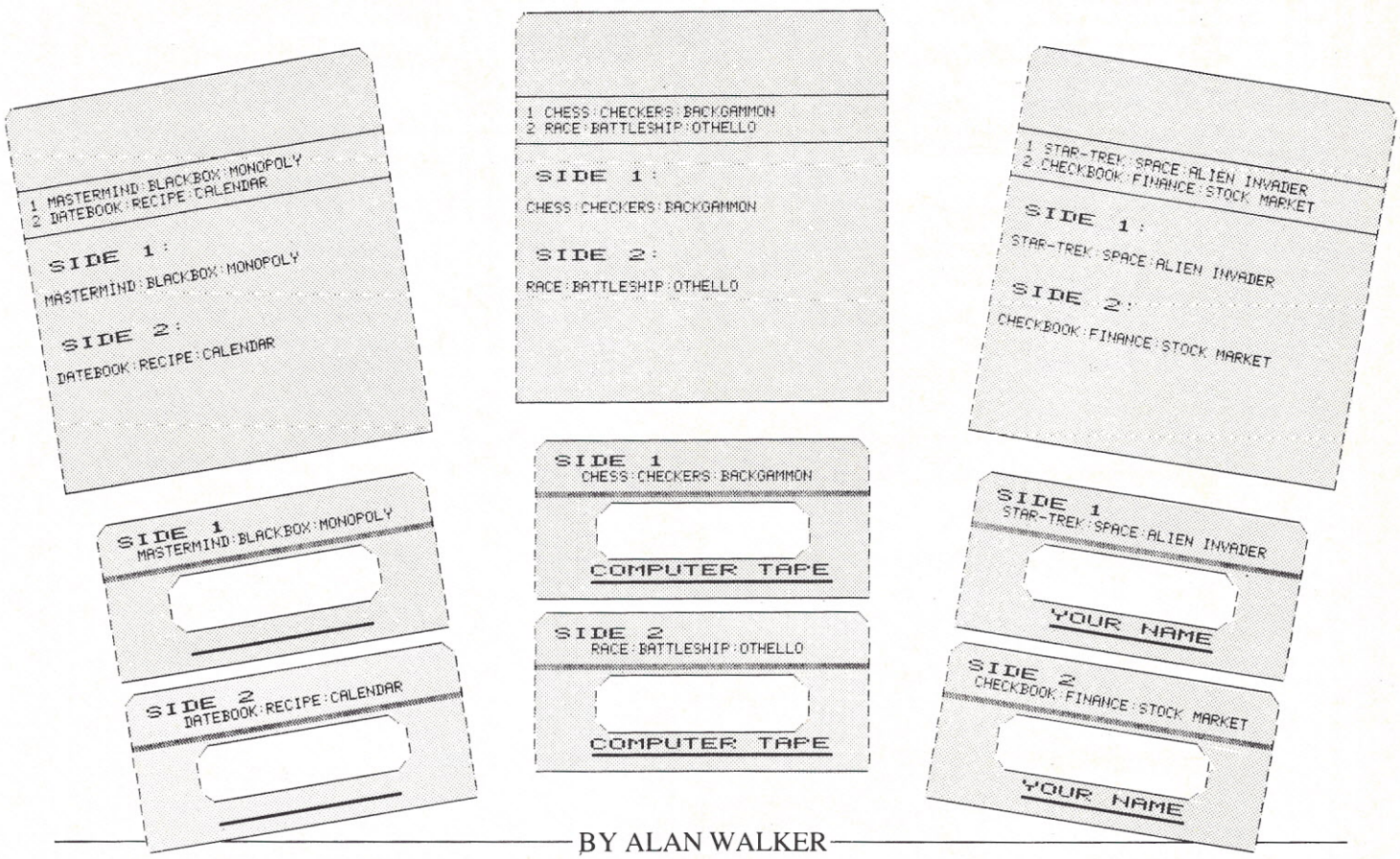
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CIRCLE 22

Cassette Tape Labels



BY ALAN WALKER

For years I've been trying to get my cassette tape file into order. I'm always shuffling programs onto different tapes and neglecting to update the label. Because the labels on the tapes have been revised so many times, many are unreadable.

This program prints out a neat label that will fit inside the two-piece Norelco-style cassette box. It also prints out a label for each side of the cassette tape itself. The label can easily be affixed to the cassette tape using rubber cement.

This program was written for the Commodore Pet, but with a few revisions could be used with other computers.

In the listing, the words in brackets, such as [DOWN], stand for cursor control characters. For the most part you can ignore them or revise them to function on your computer.

CHR$(1) in lines 2170, 3050, 3300 and 3320 sets the Commodore Printer to print in enhanced mode. CHR$(129) in lines 2180, 2240, 3060, 3310 and 3330 turns the enhanced mode off.

Program Notes

Lines 100-175: Instructions.

Lines 500-620: Get the program names.

Lines 540-550: These two lines check for an input. If there is a return with no input then A$=`` and the program knows that you are ready to proceed. Without cursor control, you might want to do this differently.

Lines 700-770: Oops! You entered too many programs, or the programs that you entered are too long. The program will only accept 36 characters.

Lines 800-870: Set up strings for printout.

Lines 1000-1300: Lets you select what you want printed out.

1. The cassette box label only
2. The cassette tape label only
3. Both labels

Lines 2000-2340: Does the actual printing of the cassette box label.

Lines 3000-3420: Prints out the cassette tape label.

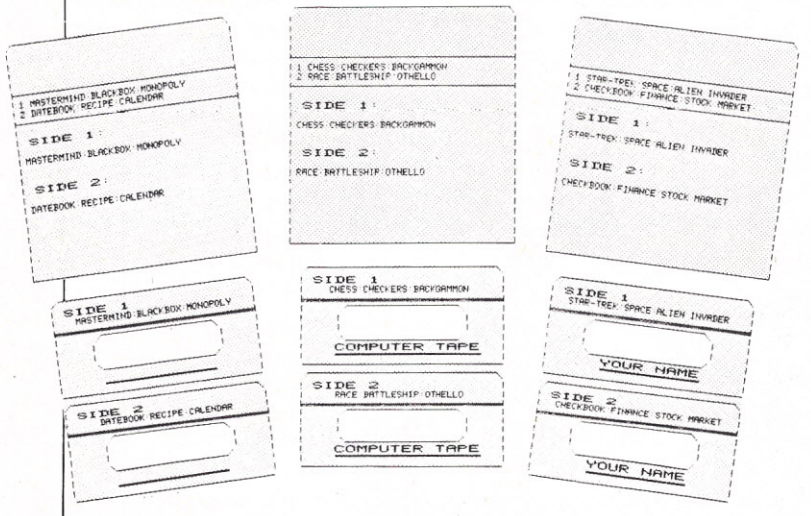
Lines 3300-3320: You can place anything here. Maybe some identification or your address. □

Variables

A$	Inputs
C$(1)	Programs on side 1
C$(2)	Programs on side 2
L	String length
BL$	String of blanks

Program Listing

```
  0 REM ********************
  1 REM *PRINT TAPE COVER*
  2 REM ********************
 10 POKE 59468,12
100 PRINT "[CLR]";TAB(8);"TAPE COVER PRINTER"
110 PRINT "[ 2 DOWN]THIS PROGRAM WILL PRINT A LABEL "
120 PRINT "[DOWN]THAT WILL FIT INSIDE THE TWO-PIECE"
130 PRINT "[DOWN]NORELCO-STYLE CASSETTE BOX. IT WILL
140 PRINT "[DOWN]ALSO PRINT A LABEL FOR THE CASSETTE
150 PRINT "[DOWN]TAPE ITSELF.  THE CASSETTE LABEL CAN
160 PRINT "[DOWN]BE AFFIXED VERY NEATLY WITH RUBBER
170 PRINT "[DOWN]CEMENT."
200 PRINT "[DOWN]PRESS RETURN TO BEGIN"
210 GET A$:IF A$="" THEN 210
500 FOR I=1 TO 2
505 S$(I)="":P=0
510 PRINT "[CLR]PRESS [RVS]RETURN[OFF] WHEN COMPLETED
520 PRINT "[DOWN]ENTER THE PROGRAMS ON SIDE"I
530 PRINT:P=P+1
540 PRINT "  PROGRAM #";P;"  _[ 3 LEFT]";
550 INPUT A$
560 IF A$="_" THEN 620
570 IF P=1 THEN S$(I)=A$:GOTO 590
580 S$(I)=S$(I)+":"+A$
590 L(I)=LEN(S$(I))
600 IF L(I)>36 GOTO 700
610 GOTO 530
620 NEXT I
630 GOTO 800
700 REM * TOO MANY CHARACTERS
705 PRINT
710 PRINT "THE PROGRAMS YOU HAVE ENTERED FOR THIS
720 PRINT "SIDE ARE TOO LONG. YOU MIGHT TRY USING
730 PRINT "ABBREVIATIONS FOR ONE OR MORE OF THEM.
740 PRINT
750 PRINT "PRESS [RVS]RETURN[OFF] WHEN YOU ARE READY
760 PRINT "TO REDO THEM.
770 GET A$:IF A$="" THEN 770
800 REM
810 C$(1)=S$(1):C$(2)=S$(2)
820 FOR J=1 TO 2
830 FOR I=1 TO 37-L(J)
840 C$(J)=C$(J)+" "
850 NEXT I
860 N$(J)=RIGHT$(STR$(J),1)
870 NEXT J
1000 REM * WHICH FUNCTION *
1010 PRINT "[CLR][ 3 DOWN]"
1020 PRINT "1 PRINT CASSETTE BOX LABEL
1030 PRINT:PRINT "2 PRINT CASSETTE TAPE LABELS
1040 PRINT:PRINT "3 PRINT OUT BOTH
1050 PRINT:PRINT:PRINT "WHICH?"
1060 GET A$:IF A$="" THEN 1060
1070 IF A$<"1" OR A$>"3" THEN 1060
1080 A=VAL(A$)
1090 ON A GOTO 1100,1200,1300
1100 GOSUB 2000:GOTO 6000
1200 GOSUB 3000:GOTO 6000
1300 GOSUB 2000:GOSUB 3000:GOTO 6000
2000 REM *PRINT CASSETTE BOX LABEL*
2010 OPEN 1,4:CMD 1
2020 PRINT " /";
2030 FOR I=1 TO 38:PRINT "¯";:NEXT I
2040 PRINT "\"
2050 FOR I=1 TO 4
2060 PRINT " !";TAB(40);"! "
2070 NEXT I
2080 PRINT " !";
2090 FOR I=1 TO 40:PRINT "-";:NEXT I
2100 PRINT "! "
2110 PRINT " ! "+N$(1)+" "+C$(1)+"! "
2120 PRINT " ! "+N$(2)+" "+C$(2)+"! "
2130 PRINT " !";
2140 FOR I=1 TO 40:PRINT "-";:NEXT I
2150 PRINT "! "
2160 PRINT " !";TAB(40);"! "
2170 PRINT " !  ";CHR$(1)"SIDE 1:";
2180 PRINT CHR$(129);TAB(24)"! "
2190 PRINT " !";TAB(40);"! "
2200 PRINT " ! "+C$(1)+"  ! "
2210 PRINT " !";TAB(40);"! "
2220 PRINT " !";TAB(40);"! "
2230 PRINT " !  ";CHR$(1)"SIDE 2:";
2240 PRINT CHR$(129);TAB(24)"! "
2250 PRINT " !";TAB(40);"! "
2260 PRINT " ! "+C$(2)+"  ! "
2270 FOR I=1 TO 6
2280 PRINT " !";TAB(40);"! "
2290 NEXT I
2300 PRINT " !";
2310 FOR I=1 TO 40:PRINT "_";:NEXT I
2320 PRINT "! "
2330 PRINT#1:CLOSE 1,4
2340 RETURN
3000 REM *TAPE LABEL*
3010 OPEN 1,4:CMD 1
3015 FOR J=1 TO 2:BL$=""
3020 PRINT " /";
3030 FOR I=1 TO 34:PRINT "¯";:NEXT I
3040 PRINT "\"
3050 PRINT " !";CHR$(1)" SIDE";J;
3060 PRINT CHR$(129);TAB(20)"! "
3070 L=36-L(J)
3080 L1=INT(L/2)
3090 FOR I=1 TO L1
3100 BL$=BL$+" ":NEXT I
3110 PRINT " !";
3120 PRINT BL$;S$(J);
3130 FOR I=1 TO L-L1:PRINT " ";:NEXT I
3140 PRINT "! "
3150 PRINT " !";
3170 FOR I=1 TO 36:PRINT "▒";:NEXT I
3180 PRINT "! "
3190 PRINT " !";
3200 PRINT TAB(7)"/──────────────────────────\";
3210 PRINT TAB(7)"! "
3220 PRINT " !";TAB(6)"!";
3230 PRINT TAB(22)"!";TAB(6)"! "
3240 PRINT " !";TAB(6)"!";
3250 PRINT TAB(22)"!";TAB(6)"! "
3260 PRINT " !";
3270 PRINT TAB(7)"\──────────────────────────/";
3280 PRINT TAB(7)"! "
3290 REM * IDENTIFICATION *
3300 PRINT " !";CHR$(1)"    ALAN WALKER    ";
3310 PRINT CHR$(129);"! "
3320 PRINT " !";CHR$(1)"    ──────────    ";
3330 PRINT CHR$(129);"! "
3335 PRINT " ";
3340 FOR I=1 TO 36:PRINT "-";:NEXT I:PRINT
3400 NEXT J
3410 PRINT#1:CLOSE 1,4
3420 RETURN
6000 END
```



How to write for Personal Computing

You've written the programs we want to publish. You – the *Personal Computing* readers – are using your computers in businesses, homes, offices and schools. Other readers, just as software-hungry as you, are eager to try out your programs, your applications and your techniques. So why not share what you've done by submitting an article to *PC?*

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Here are some handy guidelines to help you get started.

First, decide what kind of article you want to write. Do you have a *business program* that will help an executive, salesman, doctor, lawyer or shopkeeper function more efficiently? Think about how businesses can benefit from microcomputers – not only in the obvious areas of inventory, accounting and payroll, but in all departments and levels right up to the president's desk. Financial and marketing analysis, time management, planning, material handling, product design and cost accounting are areas ripe for creative programming.

How do you use your computer for *home and personal applications* in your living room, kitchen, study or den? Again, think beyond the obvious areas of checkbook balancing and budgeting (though these areas are far from exhausted) to other applications. Hobbies, home management, household inventory, gardening and landscaping, personal income and expense analysis, personal mailing lists and word processing are just a few ideas to spark your imagination.

What *education programs* have you written for children, adults, professionals, businessmen and teachers? Computers can not only teach children basic subjects such as spelling, math, geography, economics, civics, grammar, literature and science, but can help adults review or sharpen skills in these areas as well. How else can computers function in or out of the classroom to aid learning? To help teachers and administrators?

Are you proficient in some programming technique or special computer area you could explain in a *tutorial article*? How do you save time, money, computer memory or frustration when programming or using your computer? Others can benefit from the same techniques you use.

Computer games, history, humor and *fiction* are other areas rich in article and story ideas.

Your second step is to write the text of the article. Remember, readers aren't familiar with your program. So explain in detail what the program does and how it does it. Include here the overall structure of your program as well as any special algorithms or routines you've used. Give suggestions for modifying or expanding the program for other applications, other businesses or other situations.

Third, prepare your supporting documentation. Include at least a program listing and one or two sample runs, and add program notes to explain any special commands used or other special features of your program. Use charts, diagrams, figures and photos if they help explain your program and its use.

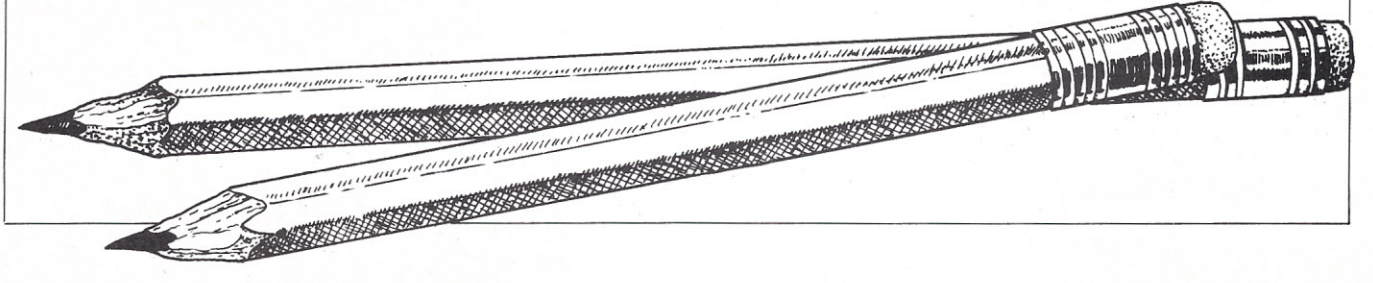
Finally, mail your manuscript. Address it to: Don Wood, Managing Editor, Personal Computing Magazine, 1050 Commonwealth Ave., Boston, MA 02215.

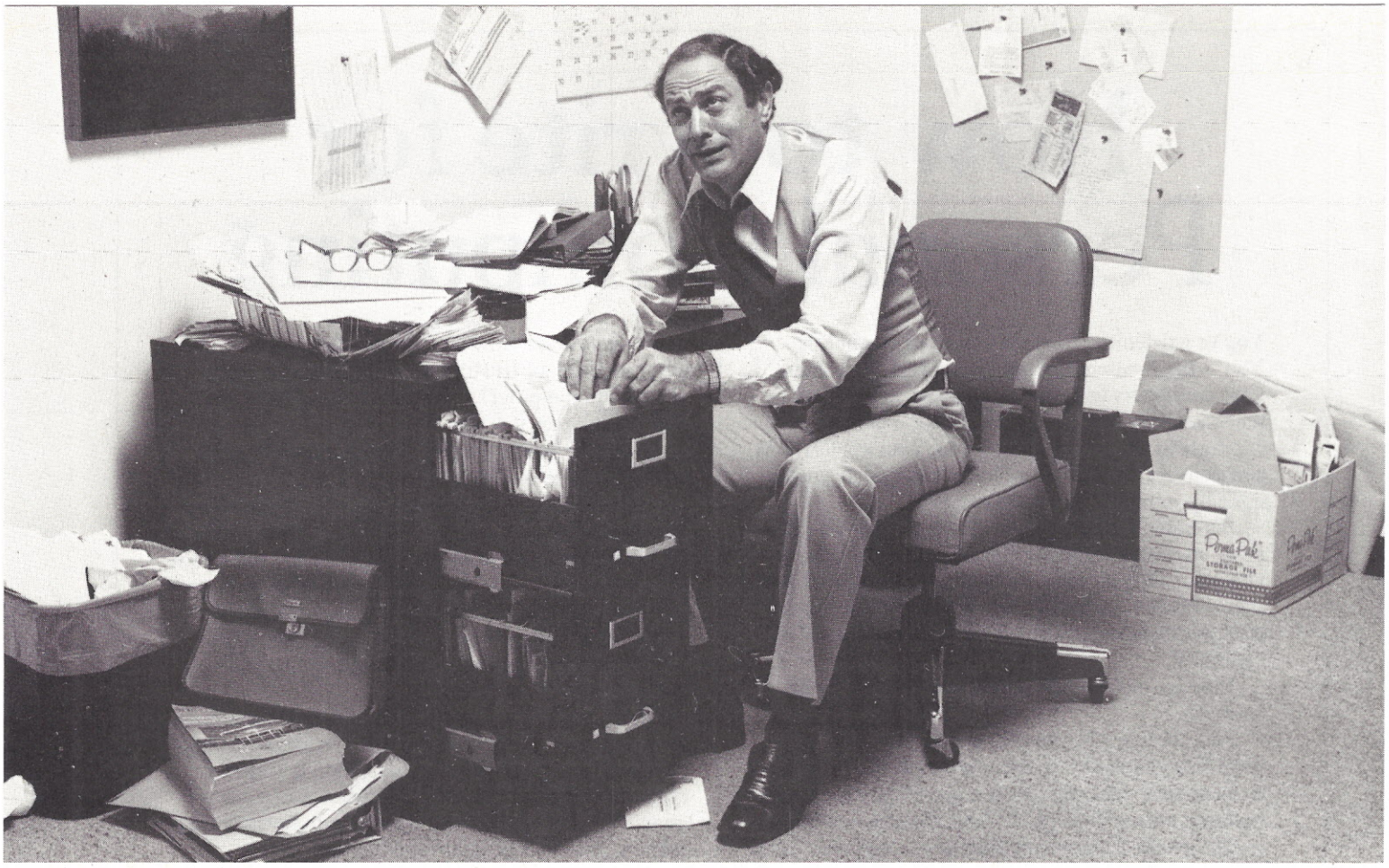
A few suggestions: All submissions should be original, typed (*not* all CAPS), double-spaced and neat. Please include your name and address on the first page of the article and enclose a self-addressed, stamped envelope for return of material.

Since we photograph program listings and sample runs exactly as you send them to us for publication in the magazine, please be sure you use a fresh ribbon for computer printouts. If you don't have a printer, you can type your listings single spaced; but again, be sure you use a new ribbon. (If your program relies heavily on graphics, you can photograph sample runs from your CRT. But take care to avoid distortion due to the curve of the screen.)

Feel free to call us if you have any questions or want to discuss specific ideas. We can give you feedback and suggest appropriate slants and approaches.

We're always looking for fresh, original ideas. While these guidelines will help you in preparing material for *Personal Computing*, don't assume we don't want your idea just because it's not mentioned here. Let us and our readers know what *you're* doing with your computer.





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CIRCLE 29

A Handy Sort

BY DWIGHT WHEELER

There are all sorts of "sorts" — internal, external, selection, insertion, exchange, and on and on — but they don't come built into your average personal computer. When you need a list of names arranged alphabetically or a group of numbers organized in ascending or descending order, it's up to you to make it happen.

Here's a sort which is short, simple and suitable for many uses. It's a modified "bubble sort", so called because, like bubbles in champagne, the lightest (lowest) elements rise to the top, while the heaviest (highest) elements settle to the bottom. It works equally well with numbers or literal strings.

Basic has three relational operators which actually do the work: < (less than), = (equal to) and > (greater than). But to use them, we have to set up the ground rules.

The Bubble Sort is really an "exchange" sort which is done in the computer's internal storage. Simply stated, starting with a list, we compare the first number (or name) with the second. If the first number is *smaller* than the second, nothing happens, and we compare the second with the third, and so on. However, if the first number is *larger* than the second, the two are exchanged. (See Figure 1.)

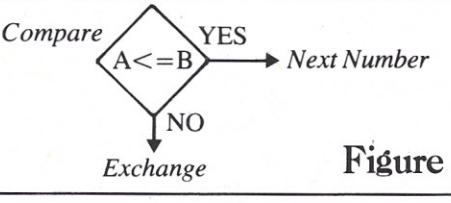


Figure 1

This sort can be demonstrated with a group of five numbers, deliberately arranged in the worst possible case where the numbers are in descending order. Figure 2 shows the movement of the numbers for each pass. Since there are five elements, there will be five-less-one, or four, passes to complete the sort. The arrows show the exchanges.

If you track the 5, you'll notice that it gets to the bottom at the end of the first pass. The 4 gets down there at the end of the second pass, while it takes the 4th and final pass for the number 1 to float up to the top.

So much for the theory. . . you want the program, so here goes: For illustration, I'll use an actual case from my wife's class (she's a teacher). Twenty of her students have just had a test and we will order the list two ways: alphabetically and numerically by grade scores with the highest on top. (Note that this program was

Dwight Wheeler holds a BS Degree in Electrical Engineering and an MS in Radio and TV Production. After 26 years in broadcasting, he is presently employed in the Instructional Media department at Hartnell College in Salinas, CA, where he is also a part-time instructor and student of Computer Science.

PASSES

1st				2nd			3rd		4th	Result
5	4	4	4	4	3	3	3	2	2	1
4	5	3	3	3	4	2	2	3	1	2
3	3	5	2	2	2	4	1	1	3	3
2	2	2	5	1	1	1	4	4	4	4
1	1	1	1	5	5	5	5	5	5	5

Figure 2

prepared and stored on cassette. We just loaded it and inserted the scores in the proper DATA statements since the names were previously set up as her class roster.)

1. Set up the list: We use the single dimensioned arrays: S$(N) for the student's name and S(N) for the score. Since there are more than 10 elements, we must have a DIMension statement. Allow a few more than expected for expansion.

```
100  DIM S$(30), S(30)
```

2. Get the DATA: There are two ways; INPUT or READ/DATA statements. I prefer the DATA statement for three reasons: it gives me the opportunity to save the data, I can see and check the entries before running the program, and if there should be a problem (Heaven forbid!), I can fix it, and re-run the program. INPUT data has to be re-entered each time it is run.

Initialize the counter and read the data.

```
110  N=1
120  READ S$(N), S(N)
```

I usually place the DATA statements at the end of the program to allow for expansion.

3. Check for end of DATA.

```
130  IF S$(N) = "END" THEN 160
```

4. Increment the counter and read the next data.

```
140  N = N+1
150  GO TO 120
```

5. Adjust the counter.

```
160  N = N-1
```

This adjustment subtracts the last entry, the flag "END", which we don't want included with the students.

6. Set up the comparison.

```
170  FOR K=1 TO N-1
```

This defines the number of passes which will be needed: one less than the total number of elements (19 in this case).

```
180  FOR J=1 TO N-K
```

Now walk through the stack on each pass, reducing the number to be compared each time:

1st pass: FOR J=1 to 20−1 (19)
2nd pass: FOR J=1 to 20−2 (18) etc.

This function improves the efficiency of the sort by ignoring the bottom elements of the stack, since we know that the heaviest elements have been deposited there on each pass.

7. Make the comparison.

```
190  IF S$(J) <= S$ (J+1) THEN 260
```

If the first name, S$(J) is less than or equal to the next name in line, we skip it, and go on to the next element. If not, then we:

8. Make the exchange.

```
200  X$ = S$(J)
210  S$(J) = S$(J+1)
220  S$(J+1) = X$
```

This three-step switch does the actual work. In line 200, the variable X$ is assigned the value of the first name S$(J). Then in line 210, the first name position is assigned the name in the second position, S$(J+1). Finally, in line 220, the second position is given the name which was in position one . . . and the switch is complete.

But hold everything! Naturally, we want to keep the proper score associated with the student's name, so we must make a similar exchange for the scores at the same time:

```
230  X = S(J)
240  S(J) = S(J+1)
250  S(J+1) = X
```

Of course, we use the numerical variable X for the scores, rather than the X$ which was used for the literal string variable used for the names.

9. Compare the next two elements.

```
260  NEXT J
```

10. Go back to the top for another pass.

```
270  NEXT K
```

11. Print the results.

```
280  FOR J = 1 TO N
290  PRINT S$(J); TAB(20); S(J)
300  NEXT J
```

12. Add the finishing touches.

```
310  PRINT
320  PRINT "NUMBER OF
STUDENTS =";N
325  END
```

13. Don't forget the DATA.

```
330  DATA "WHEELER, JON", 98.5
340  DATA "GARDEPIE, KEVIN", 99
      .
      .
      .
      .
      .
      .
      .
999  DATA "END", 0
```

To avoid an error message, you must include the "0" (zero) in the final DATA statement since the READ statement includes the two variables S$ and S in this record. If the second datum was not there, you would get an "insufficient data" error message and the program would stop on most computers.

I promised you a second list with the highest scorers on top. To get this list of names sorted we need change only the statement on line 190:

```
190  IF S(J) >= S(J+1) THEN 260
```

Note that we have changed the comparator to "greater than" to get the low scores to sink to the bottom this time.

One note of caution: This routine assumes a minimum of three names and scores. Don't try to test the program with one or two elements since the parameters in lines 170 and 180 will not be proper.

Of course, this sort can be used on any number of elements, but unless you're lucky enough to have a hard copy printer, you can read only about 20 lines at a time on a Pet CRT, less on some screens. So, you'll probably want to add a line counter and stop the printing when the screen is full.

```
272  L=1
```

— — — — — — — — — — — —

```
292 L=L+1
294 IF L>20 THEN 1000
— — — — — — — — — — — —
1000 PRINT
1010 PRINT "CONTINUE";
1020 INPUT Q$
1030 L=1
1040 GO TO 300
```

The screen will fill and stop. When you enter any letter, the program will continue with the next 20 items.

This routine has been very helpful in my programs. But don't be impatient. If you have many items (100 or more), it will take several minutes to complete a sort. If you're the type that worries when the computer just sits there and nothing blinks on the CRT, I suggest that you add this line:

```
162 PRINT "TAKE A BREAK
WHILE I SORT . . ."
```

Then go out for a long coffee break. This is not the most efficient sort, but you can use it on any computer, and it works! And that's the bottom line. □

Program Listing

```
 90 REM         "BUBBLE SORT"  PROGRAM
 95 REM  CODED BY DWIGHT WHEELER
100 DIM S$(30),S(30)
110 N=1
120 READ S$(N),S(N)
130 IF S$(N)="END" THEN 160
140 N=N+1
150 GOTO 120
160 N=N-1
170 FOR K=1 TO N-1
180 FOR J=1 TO N-K
190 IF S$(J)<=S$(J+1) THEN 260
200 X$=S$(J)
210 S$(J)=S$(J+1)
220 S$(J+1)=X$
230 X=S(J)
240 S(J)=S(J+1)
250 S(J+1)=X
260 NEXT J
270 NEXT K
272 L=1
280 FOR J=1 TO N
290 PRINT S$(J);TAB(20);S(J)
292 L=L+1
294 IF L>20 THEN 1000
300 NEXT J
310 PRINT
320 PRINT "NUMBER OF STUDENTS = ";N
325 END
330 DATA "WHEELER, JON",98.5
340 DATA "GARDEPIE, KEVIN",99
350 DATA "SMITH, JOHN",34.5
360 DATA "DOE, MARY",56.8
370 DATA "KENNEDY, ROBERT",78.9
380 DATA "GRAFT, GARRY",90.2
390 DATA "MCDONALD, SANDY",87.5
400 DATA "NEWTON, ANDY",65
410 DATA "POULTON, AMY",93.2
420 DATA "HARTNELL, JOE",44.4
430 DATA "ROCKFORD, ELLIE",75
440 DATA "HOWELL, BELL",91.3
450 DATA "WEINER, SID",77.6
460 DATA "EWING, WILLIAM",85
470 DATA "STEPHENS, PETE",88.7
480 DATA "SIMPSON, HOWARD",94
490 DATA "SMART, PHIL",100
500 DATA "FELLOWS, MARIE",80
510 DATA "BRUENER, WARD",97.6
520 DATA "SILVA, DAVID",99
999 DATA "END",0
1000 PRINT
1010 PRINT "CONTINUE";
1020 INPUT Q$
1030 PRINT
1040 GOTO 300
```

Sample Run

```
BRUENER, WARD          97.6
DOE, MARY              56.8
EWING, WILLIAM         85
FELLOWS, MARIE         80
GARDEPIE, KEVIN        99
GRAFT, GARRY           90.2
HARTNELL, JOE          44.4
HOWELL, BELL           91.3
KENNEDY, ROBERT        78.9
MCDONALD, SANDY        87.5
NEWTON, ANDY           65
POULTON, AMY           93.2
ROCKFORD, ELLIE        75
SILVA, DAVID           99
SIMPSON, HOWARD        94
SMART, PHIL            100
SMITH, JOHN            34.5
STEPHENS, PETE         88.7
WEINER, SID            77.6
WHEELER, JON           98.5

CONTINUE?Y

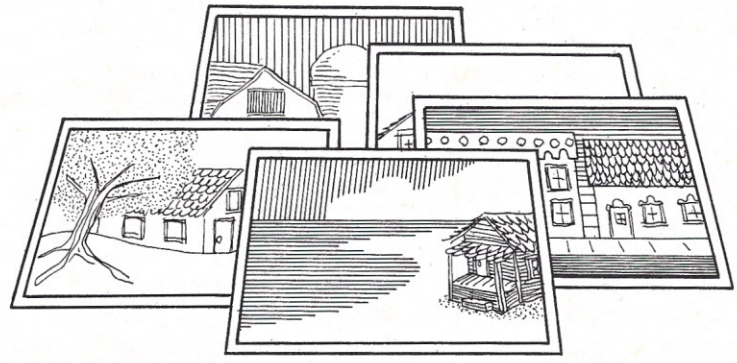

NUMBER OF STUDENTS =  20
*
```

```
 190 IF S(J) >= S(J+1) THEN 260
*
 RUN
SMART, PHIL            100
GARDEPIE, KEVIN        99
SILVA, DAVID           99
WHEELER, JON           98.5
BRUENER, WARD          97.6
SIMPSON, HOWARD        94
POULTON, AMY           93.2
HOWELL, BELL           91.3
GRAFT, GARRY           90.2
STEPHENS, PETE         88.7
MCDONALD, SANDY        87.5
EWING, WILLIAM         85
FELLOWS, MARIE         80
KENNEDY, ROBERT        78.9
WEINER, SID            77.6
ROCKFORD, ELLIE        75
NEWTON, ANDY           65
DOE, MARY              56.8
HARTNELL, JOE          44.4
SMITH, JOHN            34.5

CONTINUE?Y


NUMBER OF STUDENTS =  20
*
```

Rental Income



BY W. B. GOLDSMITH, JR.

Do you have some rental property? Thinking about getting some? Rental property can be a one-room ski cabin rented a handful of times during the year or a 300 unit residential apartment complex. It can be a money earner and a tax shelter. Rental property can give you pride of ownership or a pain in the neck.

All rentals have something in common, though — you've got to tell the income tax folks about your income and expenses each year. The numbers go on your federal Schedule E (Part II) and the appropriate corresponding form for your state income tax authority. Until recently, the Internal Revenue Service published a nice worksheet (Form 2831, Rental Income) to help you get all the numbers in the right place, but that form is no longer available. Now what can you do? Use this Rental Income program and your computer to generate a "statement attached"; then fill in the income and expense totals on your income tax return.

This Basic program prompts all the necessary entries for one rental property, combines the numbers to generate the profit or loss figure and prints a statement suitable for attaching to your income tax returns. The program returns a cash flow profit or loss number because it ignores the depreciation on your rental. I omitted the depreciation from this program for two reasons: (1) The depreciation calculation must be shown on the official Schedule E — printing it by computer would not save manually entering the information on the tax return, and two printouts of the same depreciation schedule on the same tax return might lead to some confusion. (2) The program forces you to recognize your cash flow. (It's nice when your rental gives you a tax shelter, but you want to know if that tax shelter is costing you money.)

Another use for this program is analysis of a prospective rental property purchase. Use the program as a checklist of expense and income estimates and you can get an idea of the cash flow you could expect from your investment. By comparing different properties, you can make the investment that best suits you.

User Notes

There are no "gotchas" in Rental Income. From the time you type RUN until the final copy is printed, program operation is straightforward. In fact, the program is so much fun, you may want to go out and buy a rental just to have an excuse to use it.

The Sample Run illustrates the prompting feature — enter

Mr. Goldsmith, an aerospace engineer, is enrolled to practice before the Internal Revenue Service and is an active member of the National Society of Public Accountants.

Program Listing

```
0010 REM STATEMENT OF RENTAL
0020 REM INCOME AND EXPENSES
0030 REM BY W. B. GOLDSMITH, JR.
0040 DIM R$(20),E(35)
0050 DEF FNX(A)=60-LEN(STR$(A))
0060 DEF FNY(B)=70-LEN(STR$(B))
0070 LINE= 0
0080 DIGITS= 2
0100 PRINT "STATEMENT OF RENTAL INCOME AND"
0110 PRINT "EXPENSES.  THIS PROGRAM WILL"
0120 PRINT "COLLECT AND PRINT A SUMMARY FOR"
0130 PRINT "ONE RENTAL UNIT.  USE MULTIPLE"
0140 PRINT "RUNS FOR MORE THAN ONE UNIT."
0150 PRINT
0160 INPUT "WHAT SCHEDULE NUMBER IS THIS",A(1)
0170 PRINT
0180 INPUT "TAXPAYER'S NAME",A$(1)
0190 INPUT "TAXPAYER'S I.D. NUMBER",A$(2)
0200 PRINT
0210 INPUT "KIND OF PROPERTY",A$(3)
0220 INPUT "STREET ADDRESS",A$(4)
0230 INPUT "CITY, STATE AND ZIP CODE",A$(5),A$(6)
0240 PRINT
0250 INPUT "WHAT PERIOD IS COVERED",A$(7)
0260 PRINT
0270 REM INCOME
0280 INPUT "RENTS RECEIVED",I(6)
0290 PRINT "ENTER OTHER INCOME BY TYPING"
0300 PRINT "SOURCE, AMOUNT"
0310 INPUT I$(1),I(1)
0320 IF I(1)=0 I(9)=0:GOTO400
0330 INPUT I$(2),I(2)
0340 IF I(2)=0 I(9)=1:GOTO400
0350 INPUT I$(3),I(3)
0360 IF I(3)=0 I(9)=2:GOTO400
0370 INPUT I$(4),I(4)
0380 IF I(4)=0 I(9)=3:GOTO400
0390  I(9)=4
0400  I=I(1)+I(2)+I(3)+I(4)+I(5)+I(6)
0500 REM EXPENSES
0510 PRINT
0520 PRINT "ENTER EXPENSE TOTALS FOR:"
0530 PRINT
0540 INPUT "ADVERTISING",E(1)
0550 INPUT "CLEANING",E(2)
0560 INPUT "COMMISSIONS",E(3)
0570 INPUT "GARDENING",E(4)
0580 INPUT "INSURANCE",E(5)
0590 INPUT "INTEREST",E(6)
0600 INPUT "JANITOR AND HEATING",E(7)
0610 INPUT "LEGAL AND ACCOUNTING",E(8)
0620 INPUT "MANAGEMENT FEES",E(9)
0630 INPUT "OFFICE SUPPLIES",E(10)
0640 INPUT "SALARIES",E(11)
0650 INPUT "SUPPLIES",E(12)
0660 INPUT "TAXES AND LICENSES",E(13)
0670 INPUT "TELEPHONE",E(14)
0680 INPUT "UTILITIES",E(15)
0690 PRINT "AUTOMOBILE AND TRAVEL EXPENSE"
```

Continued

the data as the program queries you and you're home free. Most entries are a single entry per prompt. CITY, STATE ZIP is set up for two entries after the prompt, so you can enter City (comma) State ZIP in the "normal" way. OTHER INCOME is also a two-entry-per-prompt field. Enter the name of the income source, a comma and the dollar amount. There are provisions for four other income sources. To end the prompt routine, type anything for the source and zero for the amount.

The same open-ended entry format is available for the expense categories REPAIRS and OTHER EXPENSES. You may enter up to eight repair expense categories and up to nine other expenses. Again, type anything and a zero to tell the program you're finished with that area and it will move to the next entry field.

Since the output is a potential income tax return attachment, a schedule number is provided. You should enter a different number for each property. The printout will add an "E" prefix to the statement because these are backups for IRS 1040 Schedule E.

Under AUTO AND TRAVEL expense, the program asks for mileage — not dollars — to see if you want to use the standard (optional) mileage rate. This rate is currently 18.5 cents per mile. If you wish to use actual expenses, enter a zero for mileage and type the total dollar amount for your transportation expense after the OTHER TRAVEL EXPENSE query. You'll note from the sample run that it's okay to enter zeroes for prompts that don't correspond to an actual expense. Any category with a zero will be dropped at statement printing time.

Finally, "Rental Income" asks which output port number you wish to use. The question has a two-fold purpose. You may have more than one printer on your system and want the flexibility of changing from run to run. It also permits you to make a last check of your printer before you hit RETURN. In the Sample Run, my video (control) terminal is at Port #1 and my system printer (a faithful TTY) is located at Port #3.

If you want more copies, type "Y" after each run and you will reenter the print sequence of the program. (My TTY isn't set up for carbons.)

The biggest problem with this program is that it makes the task look too easy. I've found it best not to exercise Rental Income in front of my tax clients — after seeing how quick and easy it is, they can't believe it's doing the job. It is.

Program Notes

Rental Income, written in SWTP 8K Basic Version 2.0, should adapt easily to other Basics having character string and one-dimension matrix capability. In a few spots, I've used multiple statements per line (a colon ":" is the separator). You can add line numbers and make these separate lines if your Basic doesn't like to double up. No program logic will be disturbed except in line 2220, and we'll get to that.

This is a working program designed to solve a specific problem in my tax preparation practice. Statements 10 through 150 provide a preamble for the program and an introduction to the user. The Define Functions in lines 50 to 60 provide a print format to line up the decimal points on the output statement. You don't need these if your Basic has a different print formatting scheme.

The Input part of Rental Income is contained in lines 160 through 1110. Statements 320, 340, 360 and 380 provide the escape from the OTHER INCOME input routine and set variable I(9), which will be used in the print routine. Statement 400 totals the income figures into variable I.

Variable M(2), which is the standard mileage rate for auto

```
0700 INPUT "MILEAGE",M(1)
0710  M(2)=0.185
0720 INPUT "OTHER TRAVEL EXPENSES",E(16)
0730 PRINT "LIST REPAIRS BY TYPE AND AMOUNT"
0740 INPUT R$(1),E(17)
0750 IF E(17)=0 THEN 900
0760 INPUT R$(2),E(18)
0770 IF E(18)=0 THEN 900
0780 INPUT R$(3),E(19)
0790 IF E(19)=0 THEN 900
0800 INPUT R$(4),E(20)
0810 IF E(20)=0 THEN 900
0820 INPUT R$(5),E(21)
0830 IF E(21)=0 THEN 900
0840 INPUT R$(6),E(22)
0850 IF E(22)=0 THEN 900
0860 INPUT R$(7),E(23)
0870 IF E(23)=0 THEN 900
0880 INPUT R$(8),E(24)
0900 PRINT "LIST OTHER EXPENSES BY TYPE AND"
0910 PRINT "AMOUNT."
0920 INPUT R$(9),E(25)
0930 IF E(25)=0 THEN 1100
0940 INPUT R$(10),E(26)
0950 IF E(26)=0 THEN 1100
0960 INPUT R$(11),E(27)
0970 IF E(27)=0 THEN 1100
0980 INPUT R$(12),E(28)
0990 IF E(28)=0 THEN 1100
1000 INPUT R$(13),E(29)
1010 IF E(29)=0 THEN 1100
1020 INPUT R$(14),E(30)
1030 IF E(30)=0 THEN 1100
1040 INPUT R$(15),E(31)
1050 IF E(31)=0 THEN 1100
1060 INPUT R$(16),E(32)
1070 IF E(32)=0 THEN 1100
1080 INPUT R$(17),E(33)
1100 REM OUTPUT ROUTINE
1110 INPUT "WHAT OUTPUT PORT NUMBER",P
1120 PORT= P
1190 REM OUTPUT
1200 DIGITS= 0
1210 PRINT TAB(58);"ATTACHMENT E-";A(1)
1220 PRINT TAB(17);"STATEMENT OF RENTAL INCOME
     AND EXPENSE"
1230 PRINT TAB(26);"(LESS DEPRECIATION)"
1240 PRINT :PRINTTAB((68-LEN(A$(7)))/2);"FOR ";A$(7)
1250 PRINT A$(1);TAB(54);"SSN ";A$(2)
1260 PRINT :PRINT"DESCRIPTION OF PROPERTY: ";A$(3)
1270 PRINT "ADDRESS OF PROPERTY:      ";A$(4)
1280 PRINT TAB(26);A$(5);", ";A$(6)
1290 PRINT :PRINT:DIGITS=2
1300 PRINT TAB(10);"INCOME"
1310 PRINT
1320 PRINT "RENTS RECEIVED";TAB(58-LEN(STR$(I(6)
     )));"$ ";I(6)
1330 IF I(9)=0 THEN 1370
1340 FOR X=1 TO I(9)
1350 PRINT I$(X);TAB(FNX(I(X)));I(X)
1360 NEXT X
1370 REM
1380 PRINT TAB(52);"---------"
1390 PRINT "GROSS INCOME FROM RENTAL";TAB(68-LEN(
     STR$(I)));"$ ";I
1400 PRINT
1410 PRINT TAB(10);"EXPENSES"
1420 PRINT
1430 PRINT "INTEREST";TAB(58-LEN(STR$(E(6))));
     "$ ";E(6)
1440 IF E(1)=0 THEN 1460
1450 PRINT "ADVERTISING";TAB(FNX(E(1)));E(1)
1460 IF E(2)=0 THEN 1480
1470 PRINT "CLEANING";TAB(FNX(E(2)));E(2)
1480 IF E(3)=0 THEN 1500
1490 PRINT "COMMISSIONS";TAB(FNX(E(3)));E(3)
1500 IF E(4)=0 THEN 1520
1510 PRINT "GARDENING";TAB(FNX(E(4)));E(4)
1520 IF E(5)=0 THEN 1540
1530 PRINT "INSURANCE";TAB(FNX(E(5)));E(5)
1540 IF E(7)=0 THEN 1560
1550 PRINT "JANITOR AND HEATING";TAB(FNX(E(7)));E(7)
1560 IF E(8)=0 THEN 1580
1570 PRINT "LEGAL AND ACCOUNTING";TAB(FNX(E(8)));E(8)
1580 IF E(9)=0 THEN 1600
1590 PRINT "MANAGEMENT FEES";TAB(FNX(E(9)));E(9)
```

Continued

expense, is set to 0.185 (18.5 cents per mile) in line 710. The standard rate allowed by the IRS changes every few years so watch your tax forms booklet for the current rate and modify 710 as required. (The 18.5 cents figure is valid for 1980. In 1979, the allowance was 17 cents.)

In the sequence from 730 to 880, REPAIRS expenses are entered. Lines 750, 770, 790, 810, 830, 850 and 870 are the keys to jump out of the input sequence. You'll see a similar sequence in lines 900 through 1080 for OTHER EXPENSES. Your experience with your own rental may suggest that this version has too many inputs for repairs and other expenses. Leaving some of these input statements out will save program keypunch time and some memory. If you decide to shorten the program here, remember to make a corresponding change in the print area to gain the most memory saving.

The remainder of the program generates the Rental Income Cash Flow Statement. Lines 1120 and 1200 provide the initial output port selection. Statement 1210 through 1290 print the statement heading information. The TAB in line 1240 is a centering calculation. Since my TTY has a 72 column printing capacity, all of my TAB calculations are based on that figure. Unless you're printing a super wide statement (100 to 132 columns), you can probably leave most of the formatting statements alone. The difference between 72 and 80 columns won't be noticeable for anything but the centered data. To correct the centering TAB, replace my "68" with the number of columns your printer uses minus 4. (The minus 4 adjusts the centering for the addition to variable A$(7) of the prefix word FOR.) For example: If you have an 80 column printer, 1240 becomes:

1240 PRINT:PRINT TAB(
(76-LEN(A$(7)))/2);"FOR ";A$(7)

Lines 1300 through 1400 print the income items. The FOR/NEXT loop of 1330 to 1360 makes use of variable i(9) which we set in the 300-400 line area. Statements in 1410 through 2140 print the expenses. The IF E(n) statements suppress the printout of categories having zero expense. If you cut back the REPAIRS and OTHER EXPENSES inputs, you may remove the corresponding IF and PRINT statements to save memory. (You can also leave them in without harming anything. The IF statements will suppress the PRINT statements for empty variables.)

The FOR/NEXT loop in 2150 through 2180 totals all expenses into variable E. Again, if you've removed some INPUT statements, you can shorten the execution time by changing the FOR statement.

Statements 2210 to 2260 print the much maligned bottom line. The cash flow gain or loss is calculated in 2210. 2220 steers the program to tag the result as a gain (line 2230) or loss (line 2250) and also removes the minus sign ("-") from a loss to allow the proper accounting notation (brackets or parentheses) to be applied in 2250. (Brackets or parentheses are more easily understood by accounting specialists — including IRS professionals — than a minus sign

```
1600 IF E(10)=0 THEN 1620
1610 PRINT "OFFICE SUPPLIES";TAB(FNX(E(10)));E(10)
1620 IF E(11)=0 THEN 1640
1630 PRINT "SALARIES";TAB(FNX(E(11)));E(11)
1640 IF E(12)=0 THEN 1660
1650 PRINT "SUPPLIES";TAB(FNX(E(12)));E(12)
1660 IF E(13)=0 THEN 1680
1670 PRINT "TAXES AND LICENSES";TAB(FNX(E(13)));E(13)
1680 IF E(14)=0 THEN 1700
1690 PRINT "TELEPHONE";TAB(FNX(E(14)));E(14)
1700 IF E(15)=0 THEN 1720
1710 PRINT "UTILITIES";TAB(FNX(E(15)));E(15)
1720 IF M(1)=0 THEN 1760
1730  E(34)=M(1)*M(2):DIGITS=0
1740 PRINT "AUTOMOBILE: ";M(1);" MILES @ ";M(2)*100;" CENTS/MILE";
1750 DIGITS= 2:PRINT TAB(FNX(E(34)));E(34)
1760 IF E(16)=0 THEN 1780
1770 PRINT "OTHER TRAVEL EXPENSE";TAB(FNX(E(16)));E(16)
1780 IF E(17)=0 THEN 1810
1790 PRINT "REPAIRS:"
1800 PRINT TAB(5);R$(1);TAB(FNX(E(17)));E(17)
1810 IF E(18)=0 THEN 1830
1820 PRINT TAB(5);R$(2);TAB(FNX(E(18)));E(18)
1830 IF E(19)=0 THEN 1850
1840 PRINT TAB(5);R$(3);TAB(FNX(E(19)));E(19)
1850 IF E(20)=0 THEN 1870
1860 PRINT TAB(5);R$(4);TAB(FNX(E(20)));E(20)
1870 IF E(21)=0 THEN 1890
1880 PRINT TAB(5);R$(5);TAB(FNX(E(21)));E(21)
1890 IF E(22)=0 THEN 1910
1900 PRINT TAB(5);R$(6);TAB(FNX(E(22)));E(22)
1910 IF E(23)=0 THEN 1930
1920 PRINT TAB(5);R$(7);TAB(FNX(E(23)));E(23)
1930 IF E(24)=0 THEN 1950
1940 PRINT TAB(5);R$(8);TAB (FNX(E(24)));E(24)
1950 IF E(25)=0 THEN 1980
1960 PRINT "OTHER EXPENSES:"
1970 PRINT TAB(5);R$(9);TAB(FNX(E(25)));E(25)
1980 IF E(26)=0 THEN 2000
1990 PRINT TAB(5);R$(10);TAB(FNX(E(26)));E(26)
2000 IF E(27)=0 THEN 2020
2010 PRINT TAB(5);R$(11);TAB(FNX(E(27)));E(27)
2020 IF E(28)=0 THEN 2040
2030 PRINT TAB(5);R$(12);TAB(FNX(E(28)));E(28)
2040 IF E(29)=0 THEN 2060
2050 PRINT TAB(5);R$(13);TAB(FNX(E(29)));E(29)
2060 IF E(30)=0 THEN 2080
2070 PRINT TAB(5);R$(14);TAB(FNX(E(30)));E(30)
2080 IF E(31)=0 THEN 2100
2090 PRINT TAB(5);R$(15);TAB(FNX(E(31)));E(31)
2100 IF E(32)=0 THEN 2120
2110 PRINT TAB(5);R$(16);TAB(FNX(E(32)));E(32)
2120 IF E(33)=0 THEN 2140
2130 PRINT TAB(5);R$(17);TAB(FNX(E(33)));E(33)
2140 PRINT TAB(52);"---------"
2150  E=0
2160 FOR X=1 TO 34
2170  E=E+E(X)
2180 NEXT X
2190 PRINT "GROSS RENTAL EXPENSES";TAB(FNY(E));E
2200 PRINT TAB(60);"----------"
2210  C=I-E
2220 IF C<0 THEN C=-C:GOTO 2250
2230 PRINT "CASH FLOW GAIN FROM RENTAL";TAB(68-LEN(STR$(C)));"$";C
2240 GOTO 2260
2250 PRINT "CASH FLOW LOSS FROM RENTAL";TAB(68-LEN(STR$(C)));
     "$(";C;")"
2260 PRINT TAB(60);"=========="
2270 PRINT
2280 PRINT
2290 PRINT
2300 PORT= 1
2310 INPUT "ANOTHER COPY",A$(8)
2320 IF LEFT$(A$(8),1)="Y" THEN 1120
2330 IF LEFT$(A$(8),1)<>"N" THEN 2310
2340 END
```

Sample Run

```
STATEMENT OF RENTAL INCOME AND
EXPENSES.  THIS PROGRAM WILL
COLLECT AND PRINT A SUMMARY FOR
ONE RENTAL UNIT.  USE MULTIPLE
RUNS FOR MORE THAN ONE UNIT.

WHAT SCHEDULE NUMBER IS THIS? 1

TAXPAYER'S NAME? L. ANNE LORD
TAXPAYER'S I.D. NUMBER? 000-00-0000

KIND OF PROPERTY? FRAME HOUSE
STREET ADDRESS? 123 ANY STREET
CITY, STATE AND ZIP CODE? UTOPIA, CA 99999

WHAT PERIOD IS COVERED? YEAR OF 1980

RENTS RECEIVED? 6000
ENTER OTHER INCOME BY TYPING
SOURCE, AMOUNT
? DEPOSITS,500
? ,0

ENTER EXPENSE TOTALS FOR:

ADVERTISING? 12
CLEANING? 50
COMMISSIONS? 0
GARDENING? 288
INSURANCE? 452
INTEREST? 3000
JANITOR AND HEATING? 0
LEGAL AND ACCOUNTING? 50
MANAGEMENT FEES? 0
OFFICE SUPPLIES? 25
SALARIES? 0
SUPPLIES? 44
TAXES AND LICENSES? 325
TELEPHONE? 15
UTILITIES? 0
AUTOMOBILE AND TRAVEL EXPENSE
MILEAGE? 624
OTHER TRAVEL EXPENSES? 0
LIST REPAIRS BY TYPE AND AMOUNT
? ROOF,389
? PLUMBING,213
? ,0
LIST OTHER EXPENSES BY TYPE AND
AMOUNT.
? DRAPERY CLEANING,65
? ,0
WHAT OUTPUT PORT NUMBER? 3
```

ATTACHMENT E-1

STATEMENT OF RENTAL INCOME AND EXPENSE
(LESS DEPRECIATION)

FOR YEAR OF 1980

L. ANNE LORD — SSN 000-00-0000

DESCRIPTION OF PROPERTY: FRAME HOUSE
ADDRESS OF PROPERTY: 123 ANY STREET
UTOPIA, CA 99999

INCOME		
RENTS RECEIVED	$ 6000.00	
DEPOSITS	500.00	
GROSS INCOME FROM RENTAL		$ 6500.00
EXPENSES		
INTEREST	$ 3000.00	
ADVERTISING	12.00	
CLEANING	50.00	
GARDENING	288.00	
INSURANCE	452.00	
LEGAL AND ACCOUNTING	50.00	
OFFICE SUPPLIES	25.00	
SUPPLIES	44.00	
TAXES AND LICENSES	325.00	
TELEPHONE	15.00	
AUTOMOBILE: 624 MILES @ 18.5 CENTS/MILE	115.44	
REPAIRS:		
ROOF	389.00	
PLUMBING	213.00	
OTHER EXPENSES:		
DRAPERY CLEANING	65.00	
GROSS RENTAL EXPENSES		5043.44
CASH FLOW GAIN FROM RENTAL		$ 1456.56

or dash.) If your Basic won't handle multiple statements per line, change line 2220 to:

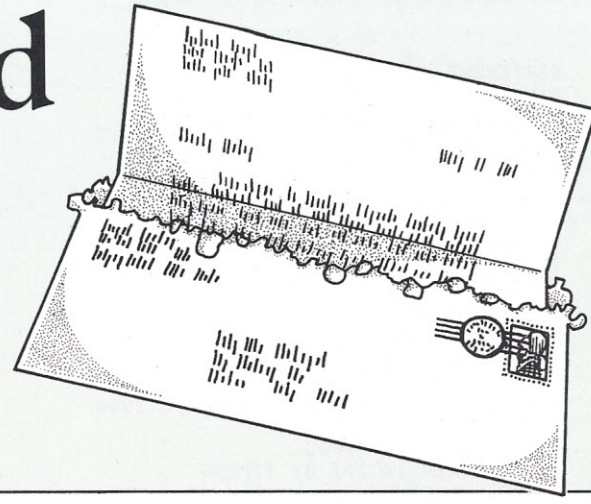
```
2220 IF C<0 THEN 2245
2245 C= -C
```

Otherwise, changing the multiple statements to consecutive line numbers can be handled with no danger of destroying program logic.

Line 2300 throws control back to the control terminal on my SWTP 6800 so the question in 2310 isn't printed on the output page.

There it is. Rental Income is a handy program that will help your computer work for you. You can use it to analyze the cash flow estimate for a rental property you're considering buying, use it as a bookkeeping check list, and generate an attachment for your income tax returns. You'll find this fun program is handy not only at tax time, but all year. □

Personalized Sales Message



BY CLINT HENTZ

I run several small service operations and occasionally need to do some advertising in addition to our prescheduled newspaper and radio advertisements. This need, coupled with the fact that I have a TRS-80, prompted me to write a program which would personalize a sales message to various groups of businesses I felt would benefit from our services. The program works very well for my business, and could also help clubs or organizations personalize fund raising promotions, invitations and announcements.

The program was written for a 48K TRS-80 Level II hooked to a Centronics tractor feed line printer. However, the program will work with 16K. For long data lists a program could be written to encompass a Print#-1 statement to put the name, address, and so forth, out on a tape and then utilize an Input#-1 statement in the listed program to bring the data in from the tape. I use the data statements in the program since my messages are sent to selected groups of potential customers which average 250 to 300 to the group.

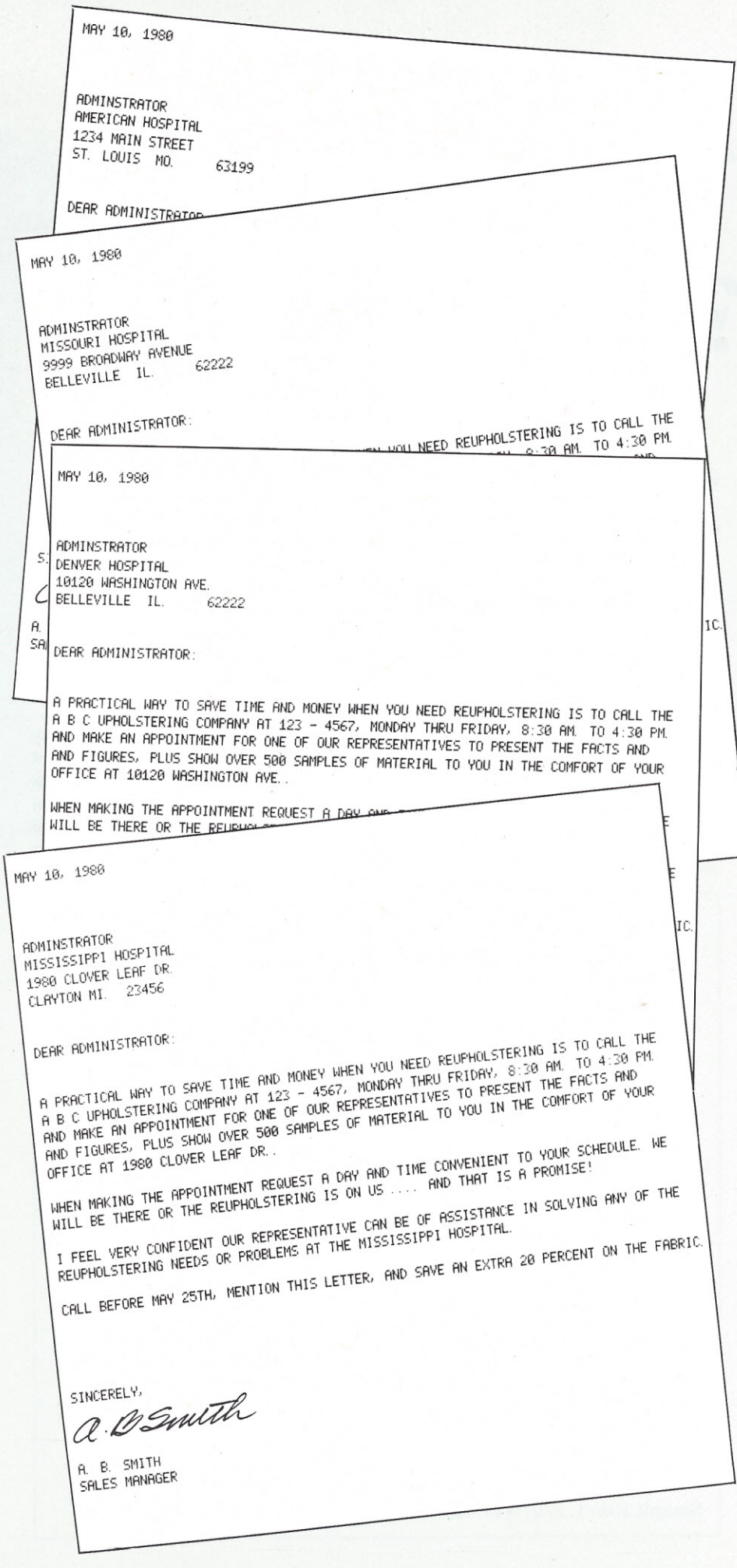
The message contained in the listed program was condensed for demonstration purposes and is not intended to reflect the quality of the messages.

I do not relish typing 250 to 300 names and addresses into the computer at one sitting, so I use short cuts. If you look at some of the data statements you will see a letter S or B following some of the addresses and before the Zip code. The S stands for St. Louis, MO.

Previous Clint Hentz articles include "Tracking Costs in a Service Business," (Oct. 79), "Keeping Tabs on Service Technicians," (Dec. 79), and "TV Registrations and Service Contract Sales," (Feb. 80).

Program Listing

```
35 REM REWRITE PROGRAM USING MULTIPLE LINES IF YOU NEED TO CONSERVE MEMORY ON A TRS-80
40 PRINT"AS EACH TYPE OF PRINTER HAS A DIFFERENT STARTING POSITION"
50 PRINT"FOR THE PAPER."
60 PRINT"ADJUST FIRST SHEET OF PAPER TO CORRECT  POSITION."
70 PRINT
80 INPUT"WHEN READY TYPE IN  LETTER  R & HIT ENTER";RR$
90 IF RR$="R" THEN 100
100 REM A$=NAME / B$=STREET ADDRESS / C$=CITY & STATE / D$=ZIP
110 READ A$,B$,C$,D$
120 REM  ZZ=SENTINAL
130 REM  LINE 150 DOES NOT PRINT ANY CUSTOMERS IN ZIP 45199
140 REM IF NO ZIPS ARE TO BE RESTRICTED DELETE 150
150 IF D$="45199" GOTO 110
160 IF A$="ZZ" THEN END
170 REM LPRINT"  " = BLANK LINE
180 LPRINT"  "
190 LPRINT"  "
200 LPRINT"  "
210 LPRINT TAB(5)"MAY 10, 1980"
220 LPRINT"  "
230 LPRINT"  "
240 LPRINT"  "
250 LPRINT"     ADMINSTRATOR"
260 LPRINT "     ";A$
270 LPRINT"     ";B$
280 IF C$="S" LPRINT"     ST. LOUIS  MO.    ";
290 IF C$="B" LPRINT"     BELLEVILLE  IL.    ";
300 IF (C$<> "S") AND (C$<> "B") LPRINT"     ";C$;
310 LPRINT"  ";D$
320 LPRINT"  "
330 LPRINT"  "
340 LPRINT"     DEAR ADMINISTRATOR:
350 LPRINT"  "
360 LPRINT"  "
370 LPRINT"     A PRACTICAL WAY TO SAVE TIME AND MONEY WHEN YOU NEED REUPHOLSTERING IS TO CALL THE"
380 LPRINT"     A B C UPHOLSTERING COMPANY AT 123 - 4567, MONDAY THRU FRIDAY, 8:30 AM. TO 4:30 PM."
390 LPRINT"     AND MAKE AN APPOINTMENT FOR ONE OF OUR REPRESENTATIVES TO PRESENT THE FACTS AND"
400 LPRINT"     AND FIGURES, PLUS SHOW OVER 500 SAMPLES OF MATERIAL TO YOU IN THE COMFORT OF YOUR"
410 LPRINT"     OFFICE AT ";B$;"."
420 LPRINT"  "
430 LPRINT"     WHEN MAKING THE APPOINTMENT REQUEST A DAY AND TIME CONVENIENT TO YOUR SCHEDULE.  WE"
440 LPRINT"     WILL BE THERE OR THE REUPHOLSTERING IS ON US ....  AND THAT IS A PROMISE!"
450 LPRINT"  "
460 LPRINT"     I FEEL VERY CONFIDENT OUR REPRESENTATIVE CAN BE OF ASSISTANCE IN SOLVING ANY OF THE"
470 LPRINT"     REUPHOLSTERING NEEDS OR PROBLEMS AT THE ";A$;"."
480 LPRINT"  "
490 LPRINT"     CALL BEFORE MAY 25TH, MENTION THIS LETTER, AND SAVE AN EXTRA 20 PERCENT ON THE FABRIC."
500 LPRINT"  "
510 LPRINT"  "
520 LPRINT"  "
530 LPRINT"  "
540 LPRINT"     SINCERELY,"
550 LPRINT"  "
560 LPRINT"  "
570 LPRINT"  "
580 LPRINT"     A. B. SMITH"
590 LPRINT"     SALES MANAGER
600 LPRINT CHR$(12)
610 GOTO 110
620 DATA AMERICAN HOSPITAL,1234 MAIN STREET,S,63199
630 DATA MISSOURI HOSPITAL,9999 BROADWAY AVENUE,B,62222
640 DATA NEBRASKA HOSPITAL,8080 WATER STREET,S,45199
650 DATA DENVER HOSPITAL,10120 WASHINGTON AVE.,B,62222
660 DATA MISSISSIPPI HOSPITAL,1980 CLOVER LEAF DR.,CLAYTON MI.,23456
670 DATA ZZ,ZZ,ZZ,ZZ
```



MAY 10, 1980

ADMINSTRATOR
AMERICAN HOSPITAL
1234 MAIN STREET
ST. LOUIS MO. 63199

DEAR ADMINISTRATOR

MAY 10, 1980

ADMINSTRATOR
MISSOURI HOSPITAL
9999 BROADWAY AVENUE
BELLEVILLE IL. 62222

DEAR ADMINISTRATOR:

MAY 10, 1980

ADMINSTRATOR
DENVER HOSPITAL
10120 WASHINGTON AVE.
BELLEVILLE IL. 62222

DEAR ADMINISTRATOR:

A PRACTICAL WAY TO SAVE TIME AND MONEY WHEN YOU NEED REUPHOLSTERING IS TO CALL THE A B C UPHOLSTERING COMPANY AT 123 - 4567, MONDAY THRU FRIDAY, 8:30 AM. TO 4:30 PM. AND MAKE AN APPOINTMENT FOR ONE OF OUR REPRESENTATIVES TO PRESENT THE FACTS AND AND FIGURES, PLUS SHOW OVER 500 SAMPLES OF MATERIAL TO YOU IN THE COMFORT OF YOUR OFFICE AT 10120 WASHINGTON AVE..

WHEN MAKING THE APPOINTMENT REQUEST A DAY

MAY 10, 1980

ADMINSTRATOR
MISSISSIPPI HOSPITAL
1980 CLOVER LEAF DR.
CLAYTON MI. 23456

DEAR ADMINISTRATOR:

A PRACTICAL WAY TO SAVE TIME AND MONEY WHEN YOU NEED REUPHOLSTERING IS TO CALL THE A B C UPHOLSTERING COMPANY AT 123 - 4567, MONDAY THRU FRIDAY, 8:30 AM. TO 4:30 PM. AND MAKE AN APPOINTMENT FOR ONE OF OUR REPRESENTATIVES TO PRESENT THE FACTS AND AND FIGURES, PLUS SHOW OVER 500 SAMPLES OF MATERIAL TO YOU IN THE COMFORT OF YOUR OFFICE AT 1980 CLOVER LEAF DR..

WHEN MAKING THE APPOINTMENT REQUEST A DAY AND TIME CONVENIENT TO YOUR SCHEDULE. WE WILL BE THERE OR THE REUPHOLSTERING IS ON US .... AND THAT IS A PROMISE!

I FEEL VERY CONFIDENT OUR REPRESENTATIVE CAN BE OF ASSISTANCE IN SOLVING ANY OF THE REUPHOLSTERING NEEDS OR PROBLEMS AT THE MISSISSIPPI HOSPITAL.

CALL BEFORE MAY 25TH, MENTION THIS LETTER, AND SAVE AN EXTRA 20 PERCENT ON THE FABRIC.

SINCERELY,

A. B. SMITH
SALES MANAGER

The B stands for Belleville, IL. This saves time by not having to type out those complete cities and states several hundred times. The program converts the S and B to the correct wording. See lines 280 and 290. The data statements could contain first and last names to be more personalized. I do not use them simply because I do not know the people connected with the businesses I contact. However, in a club or organization access to the names would not be a problem.

To reduce time I suggest using a window envelope. Have one handy when preparing the program as you'll need to know the number of spaces it will require to place the name and address in the correct position. If your printer does not allow the paper to be adjusted on the left hand side, you can make the margin by using the LPRINT TAB(X) or by leaving a specific number of spaces between the LPRINT`` and the beginning of the line. See lines 210 and 370 for an example of each. They both give the same result.

Adding a line or two such as IF D$ = ``45199`` GOTO 110 causes the program to skip names and addresses with the Zip code 45199. Of course you would insert your own Zip code number. See line 150.

Another tip is to design the message so the name or address appears at the end of a line, preferably in the last line of a paragraph. That way you do not have to worry about the differences in the length of the names and addresses.

CHR$(11) in line 600 runs the paper to the top of the next sheet. This statement is faster than a series of LPRINT`` `` statements.

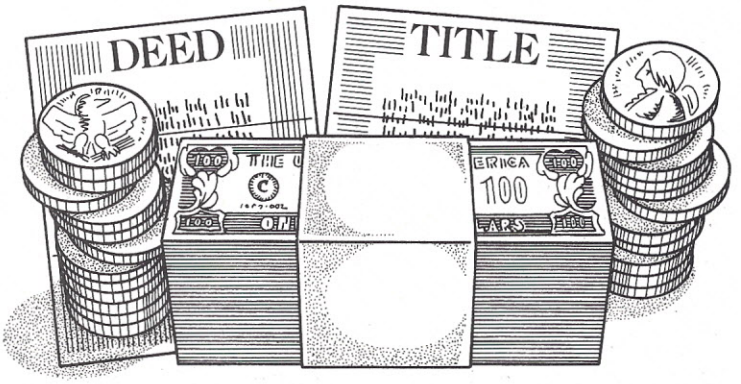
However, the CHR$(11) function might create a problem when you advance the paper to the top of the next sheet if you stop the output from the computer to the printer during the run and then attempt to re-run from the beginning of the program. I just turn off the computer and reload the program again, then all works well. If this creates a problem for you, use LPRINT`` `` for each line you need to take the paper to the top of the next page.

The pin feed strip is removed from the sides of the paper and the message inserted into the window envelope, thereby eliminating the need for printing a mailing label and affixing it to an envelope.

From a practical standpoint, this program is an inexpensive and quick way to present a personalized message to a prospective customer or organization.□

What Are You Worth?

BY DAVID M. DOLAN



What are you worth financially? If you've tried to figure it out, you may have gone through the routine of gathering together various scraps of paper with figures like bank account numbers and balances and mortgage statements on them, scribbling out a rough estimate, then either throwing out the whole mess or storing it away in such a good hiding place that when you went to repeat the process a year later it was hidden even from you. After going through that process myself a number of times, I decided that an organized disk file was just the place for all that information and my microcomputer was just the "fellow" to do all that tedious adding and subtracting.

The program utilizes a random access file called WORTH and a sequential file called ANNUAL. When you run the program for the first time these files are automatically created and initialized. You begin by adding the information describing your various assets and liabilities to the WORTH file as requested. For instance, in response to ASSET/LIABILITY: you might say SAVINGS ACCT. #13-3434-44 and give the name of the bank as the LOCATION.

The category of the entry is given as BUSINESS, REAL ESTATE, SECURITY (stock certificates, etc.), PENSION, CASH, MISC. PROPERTY, or LIABILITY (loans, mortgages, etc.). Next you enter the value of the asset/liability. Finally, if the entry is an asset the program will ask you if it is REGULAR or RESTRICTED. If you classify an entry as "restricted" then when all entries are listed later you will be required to correctly enter a predetermined codeword to list restricted entries as well. This feature is particularly useful if there are some entries you want kept private when you demonstrate the program, for instance. Just enter an incorrect codeword and the program will apparently operate correctly but will ignore all restricted entries. (Note that in Line 60 I use the codeword "OK" because on my Hazeltine 1500 this appears as "K".)

In normal operation you would continue to update your entries to the ANNUAL file until the end of the year. You will then list the entire file by category and instruct the program to write the accumulated totals under the various categories to the ANNUAL file (see Sample Run 3). If you follow this routine, at the end of each year, you'll have a continuous record of changes in your various assets and liabilities and will be able to see whether your net worth is increasing or decreasing in each category. Also, after you've accumulated at least 2 years of data the program will allow you to compare your total worth in one year with any other year (see Sample Run 4).

The program is written in North Star Basic, Version 6, Release 4. It occupies about 8K bytes, so including the interpreter, you'll need at least 24K of memory.

Program output is configured for any 80 column, 24 line terminal. You might have to change the home cursor/clear screen character in line 30. My system consists of a Hazeltine 1500 terminal and North Star Horizon-2 computer with 48K bytes of memory. □

```
                    **** PERSONAL ASSETS PROGRAM ****

          1) ADD ASSET/LIABILITY              4) DELETE ASSET/LIABILITY
          2) UPDATE ASSET/LIABILITY           5) ANNUAL COMPARISON
          3) LIST ASSETS/LIABILITIES          6) EXIT PROGRAM
?1

THERE IS ROOM FOR 34 RECORDS
ENTRY# 11
---------
ENTER 9999 TO EXIT

                (                                   )
ASSET/LIABILITY: SAVINGS 5 1/2% #566-34-3434
ENTER '^' TO CORRECT ANY PREVIOUS ENTRY

        (               )
LOCATION: BANK OF NEWARK
CATEGORY: (B)USINESS (R)EAL ESTATE (S)ECURITY (P)ENSION
          (C)ASH (M)ISC.PROPERTY (L)IABILITY
?C
ASSET/LIABILITY AMOUNT/VALUE: 505.50
CLASSIFICATION (1)REGULAR (2)RESTRICTED: 1

THERE IS ROOM FOR 33 RECORDS
ENTRY# 12
---------
ENTER 9999 TO EXIT

                (                                   )
ASSET/LIABILITY: 9999
~
                    **** PERSONAL ASSETS PROGRAM ****

          1) ADD ASSET/LIABILITY              4) DELETE ASSET/LIABILITY
          2) UPDATE ASSET/LIABILITY           5) ANNUAL COMPARISON
          3) LIST ASSETS/LIABILITIES          6) EXIT PROGRAM
?
```

Sample Run 1. Entry of an Asset to WORTH file.

```
                    **** PERSONAL ASSETS PROGRAM ****

          1) ADD ASSET/LIABILITY              4) DELETE ASSET/LIABILITY
          2) UPDATE ASSET/LIABILITY           5) ANNUAL COMPARISON
          3) LIST ASSETS/LIABILITIES          6) EXIT PROGRAM
?3
~


YEAR (19YY): 1980
CODEWORD ~OK
PRINTER? Y
LIST BY (N)UMBER OR (C)ATEGORY: N


                  *** ASSET/LIABILITY LIST FOR 1980 ***
=============================================================================
NO. ASSET/LIABILITY                 LOCATION       CATEGORY      AMOUNT/VALUE
=============================================================================
 1  SAVINGS 5 1/4% #1233-444-0      BANK OF OHIO   CASH              1540.30
 2  CHECKING #4-44-34343-99         COAST FEDERAL  CASH              1150.88
 3  SAVINGS 6 1/2% #4-2323-999      NEVADA BANK    CASH              3044.22
 4  MUNICIPAL BOND FUND #100-333-4  DREYFUS N/YORK SECURITY          5055.33
 5  HOUSEHOLD GOODS                 HOUSE ADDRESS  MISC.PROPERTY     8033.00
 6  DAVE'S PROGRAMMING CO.          BOX 6755 L.A.  BUSINESS          5012.44
 7  SAVINGS (KEOGH ACCT) #11-999    WELLINGTON S&L PENSION           7800.50
 8  HOUSE AND LAND                  LOS ANGELES    REAL ESTATE      70000.00
 9  MORTGAGE ON HOUSE #44-4343-99   BANK OF CALIF. LIABILITY        60000.00
 10 SAVINGS 5 1/2% #566-34-3434     BANK OF NEWARK CASH               505.50
-----------------------------------------------------------------------------
YOUR NET WORTH IS:  $42,142.17
```

Sample Run 2. Listing of Assets/Liabilities (Note use of codeword).

```
                    **** PERSONAL ASSETS PROGRAM ****

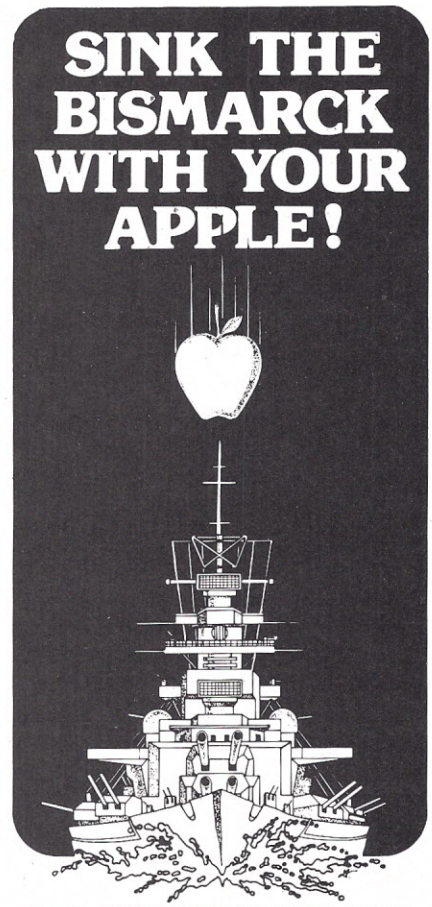
          1) ADD ASSET/LIABILITY              4) DELETE ASSET/LIABILITY
          2) UPDATE ASSET/LIABILITY           5) ANNUAL COMPARISON
          3) LIST ASSETS/LIABILITIES          6) EXIT PROGRAM
?3
~


YEAR (19YY): 1980
CODEWORD ~OK
PRINTER? Y
LIST BY (N)UMBER OR (C)ATEGORY: C
DO YOU WANT SAVE RECORD TO ANNUAL FILE? Y
YEAR: 1980              **** NET WORTH EVALUATION ****
=============================================================================
NO. ASSET                           LOCATION       CATEGORY      AMOUNT/VALUE
=============================================================================
 1  SAVINGS 5 1/4% #1233-444-0      BANK OF OHIO   CASH              1540.30
 2  CHECKING #4-44-34343-99         COAST FEDERAL  CASH              1150.88
 3  SAVINGS 6 1/2% #4-2323-999      NEVADA BANK    CASH              3044.22
 10 SAVINGS 5 1/2% #566-34-3434     BANK OF NEWARK CASH               505.50
-----------------------------------------------------------------------------
    TOTAL VALUE OF CASH          $6,240.90
-----------------------------------------------------------------------------
 4  MUNICIPAL BOND FUND #100-333-4 DREYFUS N/YORK SECURITY          5055.33
-----------------------------------------------------------------------------
    TOTAL VALUE OF SECURITY      $5,055.33
-----------------------------------------------------------------------------
 8  HOUSE AND LAND                  LOS ANGELES    REAL ESTATE      70000.00
-----------------------------------------------------------------------------
    TOTAL VALUE OF REAL ESTATE  $70,000.00
-----------------------------------------------------------------------------
 7  SAVINGS (KEOGH ACCT) #11-999    WELLINGTON S&L PENSION           7800.50
-----------------------------------------------------------------------------
    TOTAL VALUE OF PENSION       $7,800.50
-----------------------------------------------------------------------------
 5  HOUSEHOLD GOODS                 HOUSE ADDRESS  MISC.PROPERTY     8033.00
-----------------------------------------------------------------------------
    TOTAL VALUE OF MISC.PROPERTY $8,033.00
-----------------------------------------------------------------------------
 6  DAVE'S PROGRAMMING CO.          BOX 6755 L.A.  BUSINESS          5012.44
-----------------------------------------------------------------------------
    TOTAL VALUE OF BUSINESS      $5,012.44
-----------------------------------------------------------------------------
                    TOTAL ASSETS ARE WORTH: $102,142.17

=============================================================================
NO. LIABILITY                       LOCATION       CATEGORY      AMOUNT/VALUE
=============================================================================
 9  MORTGAGE ON HOUSE #44-4343-99   BANK OF CALIF. LIABILITY        60000.00
-----------------------------------------------------------------------------
                    TOTAL LIABILITY IS:  $60,000.00

YOUR TOTAL WORTH AS OF 1980 IS:  $42,142.17
```

Sample Run 3. Assets/Liabilities by Category saved to ANNUAL file.



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CIRCLE 21

```
                    **** PERSONAL ASSETS PROGRAM ****

          1) ADD ASSET/LIABILITY              4) DELETE ASSET/LIABILITY
          2) UPDATE ASSET/LIABILITY           5) ANNUAL COMPARISON
          3) LIST ASSETS/LIABILITIES          6) EXIT PROGRAM
?5
CODEWORD: ~OK
~

1) PRINT ANNUAL RECORDS  2)COMPARE RECORDS
?1


-------------------------------------------------------------------------------
YEAR CASH    SECURITY REALEST. PENSION  MISC.PRP BUSINESS LIABILITY TOTAL
-------------------------------------------------------------------------------
 1979 4950    5055     70000    7800     8033     5012     60000    40852
 1980 6240    5055     70000    7800     8033     5012     60000    42142
-------------------------------------------------------------------------------
```

```
                    **** PERSONAL ASSETS PROGRAM ****

          1) ADD ASSET/LIABILITY              4) DELETE ASSET/LIABILITY
          2) UPDATE ASSET/LIABILITY           5) ANNUAL COMPARISON
          3) LIST ASSETS/LIABILITIES          6) EXIT PROGRAM
?5
CODEWORD: ~OK
~

1) PRINT ANNUAL RECORDS  2)COMPARE RECORDS
?2
~


PRESENT YEAR (19YY): 1980
YEAR FOR COMPARISON: 1979
SINCE 1979 YOUR NET WORTH HAS INCREASED   $1,290.00

HIT RETURN TO CONTINUE
```

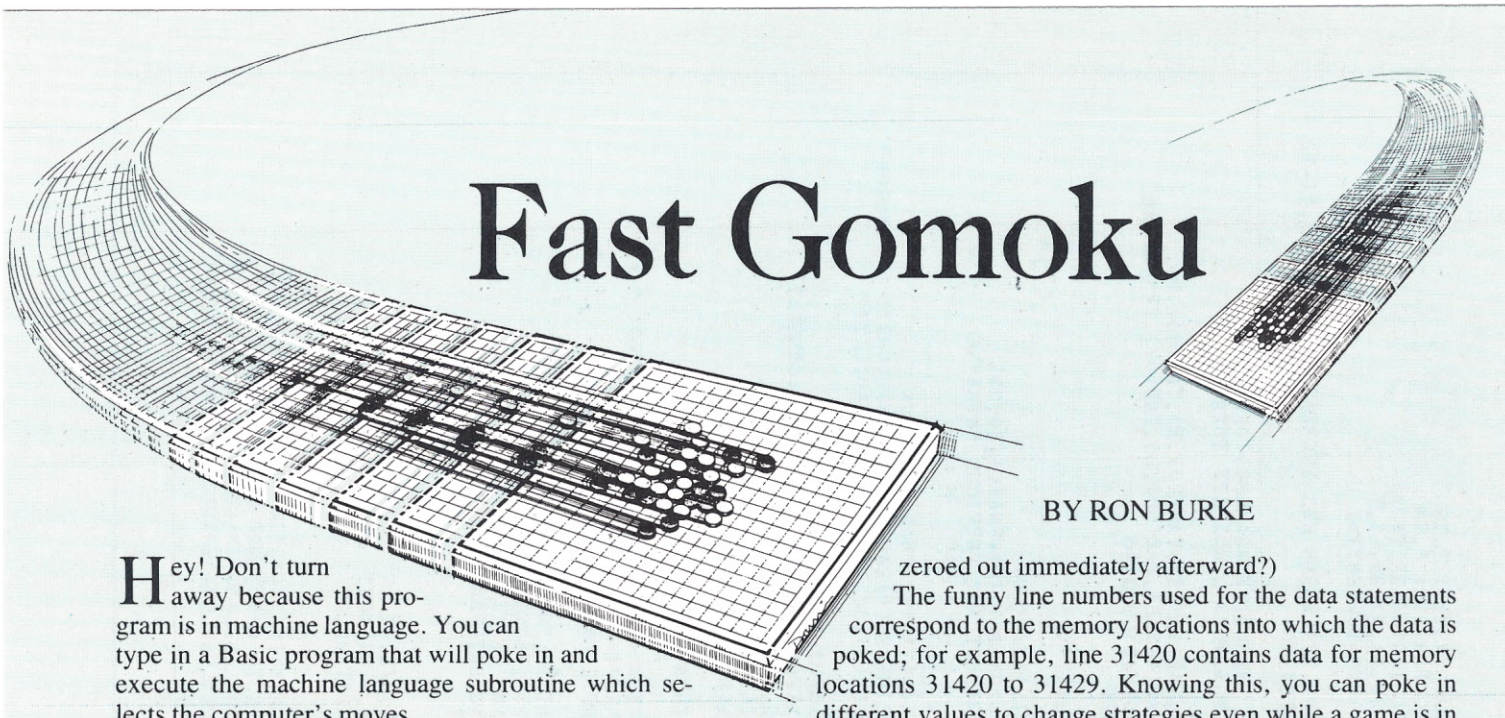
Sample Run 4. Listing of annual records and comparison.

Program Listing

```
 10 REM* PERSONAL ASSETS PROGRAM
 20 REM* COPYRIGHT DAVID M.DOLAN, DECEMBER 1978
 30 C7$=CHR$(126)+CHR$(28)\REM* CLEAR SCREEN FOR HAZELTINE 1500
 40 DIMB$(60),I$(58),A$(58),U$(58),C$(13),C1$(15),Y$(4),L9$(79)
 50 L=66
 60 C8$="~OK"\REM* CODEWORD
 70 B$=""\FORI=1TO60\B$=B$+" "\NEXT
 80 DEF FNA$(S,E,U$)
 90 IFU$=""THENRETURNA$(S,E)
100 U$=U$+B$\RETURNU$
110 FNEND
120 O=FILE("WORTH")\IFO=-1THENGOSUB1650
130 OPEN#1,"WORTH",L1\READ#1%0,N
140 REM*MENU
150 !C7$\!TAB(23),"**** PERSONAL ASSETS PROGRAM ****"\!
160 !TAB(10),"1) ADD ASSET/LIABILITY",
170 !TAB(45),"4) DELETE ASSET/LIABILITY"
180 !TAB(10),"2) UPDATE ASSET/LIABILITY",
190 !TAB(45),"5) ANNUAL COMPARISON"
200 !TAB(10),"3) LIST ASSETS/LIABILITIES",
210 !TAB(45),"6) EXIT PROGRAM"
220 INPUTC\ONCGOTO230,310,410,1010,1090,1790
230 REM*ADD ASSET/LIABILITY
240 !\!"THERE IS ROOM FOR",INT(L1*250/L)-(N+1)," RECORDS"
250 A$=B$\!"ENTRY#",N+1\!"---------"
260 GOSUB1380\IFU$="9999"THEN290
270 WRITE#1%L*N+5,A$,V,&F,NOENDMARK\N=N+1
280 GOTO240
290 WRITE#1%0,N,NOENDMARK
880 FORX=1TO20\IFTYP(2)=0THENEXIT900
890 READ#2,Y1,C1,S1,R1,P1,M1,B1,L1,T9\NEXT
900 WRITE#2,VAL(Y$),T(1),T(2),T(3),T(4),T(5),T(6),INT(T3),INT(T-T3)
910 CLOSE#2
920 T=0\T3=0\W=0\GOSUB1760\GOTO140
930 !#W,"YEAR: ",Y$,TAB(25),"**** NET WORTH EVALUATION ****"
940 GOSUB1780
950 !#W,"NO. ",TAB(4),C1$,TAB(35),"LOCATION",
960 !#W,TAB(50),"CATEGORY",TAB(63),"AMOUNT/VALUE"
970 GOSUB1780
980 RETURN
990 !#W,N9+1,TAB(4),A$(1,30),TAB(35),A$(31,45),
1000 !#W,TAB(45),A$(46,58),TAB(60),%10F2,V\RETURN
1010 REM*DELETE ENTRY
1020 !C7$\!
1030 INPUT"NUMBER OF ENTRY TO BE DELETED: ",N9\N9=N9-1
1040 READ#1%L*N9+5,A$,V,&F\GOSUB990
1050 INPUT"CORRECT? ",A1$\IFA1$(1,1)<>"Y"THEN140
1060 A$=B$\F=0
1070 WRITE#1%L*N9+5,A$,0,&F,NOENDMARK
1080 GOTO140
1090 REM*ANNUAL COMPARISON
1100 INPUT"CODEWORD: ",C9$
1110 IFC9$<>C8$THEN140
1120 OPEN#2,"ANNUAL"\READ#2,P
1130 !C7$\!
1140 !"1) PRINT ANNUAL RECORDS  2)COMPARE RECORDS"
1150 INPUTC\IFC=2THEN1220
1160 GOSUB1750
1170 GOSUB1310
1180 FORZ=1TO20\IFTYP(2)=0THENEXIT1200
1190 READ#2,Y1,C1,S1,R1,P1,M1,B1,L1,T2\GOSUB1350\NEXT
1200 GOSUB1770
1210 GOTO1370
```

```
300 GOTO140
310 REM*UPDATE/DISPLAY INDIVIDUAL ENTRY
320 !\INPUT"ENTRY # ",N9\N9=N9-1
330 READ#1%L*N9+5,A$,V,&F
340 IFF=2THENINPUT"CODEWORD: ",C9$ELSE360
350 IFC9$<>C8$THEN140
360 GOSUB940\GOSUB990
370 !\INPUT"UPDATE? ",A1$\IFA1$(1,1)<>"Y"THEN400
380 !"HIT RETURN IF NO CHANGE"\!
390 GOSUB1410\WRITE#1%L*N9+5,A$,V,&F,NOENDMARK
400 GOTO140
410 REM*LIST ENTRIES
420 !C7$\!
430 INPUT"YEAR (19YY): ",Y$
440 INPUT"CODEWORD ",C9$
450 GOSUB1750
460 INPUT"LIST BY (N)UMBER OR (C)ATEGORY: ",A1$
470 IFA1$(1,1)="C"THEN590
480 C1$="ASSET/LIABILITY"
490 !#W,TAB(20),"*** ASSET/LIABILITY LIST FOR ",Y$," ***"
500 GOSUB940\FORN9=0TON-1\READ#1%L*N9+5,A$,V,&F
510 IFV=0THEN550
520 IFF=2THENIFC9$<>C8$THEN550
530 GOSUB990
540 IFF=1ORF=2THENT=T+VELSET=T-V
550 NEXT
560 GOSUB1770
570 !#W,"YOUR NET WORTH IS: ",%C$11F2,T
580 T=0\W=0\GOSUB1760\GOTO140
590 REM*LIST BY CATEGORY
600 INPUT"DO YOU WANT SAVE RECORD TO ANNUAL FILE? ",A1$
610 IFA1$(1,1)="Y"THENF2=1
620 C1$="ASSET"\GOSUB930
630 RESTORE
640 FORZ=1TO6\READC$\C$=C$+B$
650 FORN9=0TON-1\READ#1%L*N9+5,A$,V,&F
660 IFV=0THEN700\IFC$<>A$(46,58)THEN700
670 IFF=1THEN690
680 IFF=2THENIFC9$<>C8$THEN700
690 GOSUB990\T1=T1+V\T=T+V\T(Z)=INT(T1)
700 NEXTN9
710 GOSUB1770
720 !#W,TAB(4),"TOTAL VALUE OF ",C$,TAB(30),%C$10F2,T1
730 GOSUB1770
740 T1=0
750 NEXTZ
760 !#W,TAB(20),"TOTAL ASSETS ARE WORTH: ",%C$11F2,T\!#W
770 C1$="LIABILITY"\GOSUB940
780 READC$\C$=C$+B$
790 FORN9=0TON-1\READ#1%L*N9+5,A$,V,&F
800 IFC$<>A$(46,58)THEN820
810 GOSUB990\T3=T3+V
820 NEXT
830 GOSUB1770
840 !#W,TAB(20),"TOTAL LIABILITY IS: ",%C$11F2,T3\!#W
850 !#W,"YOUR TOTAL WORTH AS OF ",Y$," IS: ",%C$11F2,T-T3
860 IFF2<>1THEN920
870 OPEN#2,"ANNUAL"\READ#2,P
1220 !C7$
1230 INPUT"PRESENT YEAR (19YY): ",Y9
1240 INPUT"YEAR FOR COMPARISON: ",Y8
1250 FORX=1TO20\IFTYP(2)=0THENEXIT1290
1260 READ#2,Y1,C1,S1,R1,P1,M1,B1,L1,T
1270 IFY1=Y9THENT1=T\IFY1=Y8THENT2=T
1280 NEXT
1290 !"SINCE",Y8," YOUR NET WORTH HAS INCREASED ",%C$11F2,T1-T2
1300 T=0\T1=0\T2=0\GOTO1370
1310 GOSUB1770
1320 !#W,"YEAR CASH    SECURITY REALEST. PENSION",
1330 !#W,"  MISC.PRP BUSINESS LIABILITY TOTAL"
1340 GOSUB1770\RETURN
1350 !#W,Y1,TAB(5),C1,TAB(13),S1,TAB(22),R1,TAB(31),P1,
1360 !#W,TAB(40),M1,TAB(49),B1,TAB(58),L1,TAB(67),T2\RETURN
1370 CLOSE#2\GOSUB1760\W=0\GOTO140
1380 REM*GET ASSET INFO
1390 RESTORE
1400 !"ENTER 9999 TO EXIT"\!
1410 !"                (                                    )"
1420 INPUT"ASSET/LIABILITY: ",U$
1430 IFU$="9999"THEN1620\A$(1,30)=FNA$(1,30,U$)
1440 !"ENTER '^' TO CORRECT ANY PREVIOUS ENTRY"\!
1450 !"          (                )"
1460 INPUT"LOCATION: ",U$
1470 IFU$="^"THEN1410\A$(31,45)=FNA$(31,45,U$)
1480 !"CATEGORY: (B)USINESS (R)EAL ESTATE (S)ECURITY (P)ENSION"
1490 !"           (C)ASH (M)ISC.PROPERTY (L)IABILITY"
1500 INPUTU$
1510 IFU$="^"THEN1450\IFU$=""THEN1540
1520 FORZ=1TO7\READC$\IFU$(1,1)=C$(1,1)THENU$=C$\NEXT
1530 A$(46,58)=FNA$(46,58,U$)
1540 INPUT"ASSET/LIABILITY AMOUNT/VALUE: ",U$
1550 IFU$="^"THEN1480\IFU$=""THEN1570
1560 V=VAL(U$)
1570 IFA$(46,46)<>"L"THEN1590
1580 F=3\GOTO1620
1590 INPUT"CLASSIFICATION (1)REGULAR (2)RESTRICTED: ",F$
1600 IFF$="^"THEN1540\IFF$=""THEN1620
1610 F=VAL(F$)\IFF<1ORF>2THEN1590
1620 RETURN
1630 DATA"CASH","SECURITY","REAL ESTATE","PENSION"
1640 DATA"MISC.PROPERTY","BUSINESS","LIABILITY"
1650 REM*FILE CREATE AND INITIALIZE SR
1660 CREATE"WORTH",11\CREATE"ANNUAL",4
1670 OPEN#1,"WORTH",L1
1680 I$=B$\I=0
1690 WRITE#1%0,0
1700 FORN1=0TOINT(L1*250/L)-1
1710 WRITE#1%L*N1+5,I$,0,&I\NEXT
1720 OPEN#2,"ANNUAL"\WRITE#2,0
1730 CLOSE#1\CLOSE#2
1740 RETURN
1750 INPUT"PRINTER? ",A1$\IFA1$(1,1)="Y"THENW=1\RETURN
1760 !\INPUT"HIT RETURN TO CONTINUE",A1$\!\RETURN
1770 L9$="-"\FORI=1TO79\L9$=L9$+"-"\NEXT\!#W,L9$\RETURN
1780 L9$="="\FORI=1TO79\L9$=L9$+"="\NEXT\!#W,L9$\RETURN
1790 CLOSE#1\CLOSE#2\END
```

Fast Gomoku



BY RON BURKE

Hey! Don't turn away because this program is in machine language. You can type in a Basic program that will poke in and execute the machine language subroutine which selects the computer's moves.

The original version of this Gomoku program, written by Jerry Crouch, was published in the October 1979 issue of *Personal Computing*. I was impressed by how well the program played, but annoyed by its slowness, even after I rewrote it for maximum speed on the TRS-80. So I redid it in machine language, and now the program moves instantly. Program logic is the same as detailed in Jerry's article, to which you may wish to refer.

This machine code will execute on any Z-80 or 8080 system with free memory between 31000 and 32400. If you want a version located elsewhere — say for a 4K machine — and have something good to trade, drop me a note in care of this magazine.

On the 16K TRS-80, answer 31000 to the "MEMORY SIZE?" question before loading this program. Incidently, you can call up the "MEMORY SIZE?" question without turning off your machine by entering SYSTEM and then entering "/0". This will also clear any resident programs out of your memory.

Operation of the Basic program given here is straightforward and doesn't need an extended description. The machine language subroutine is another story, but here's how to get some extra fun out of it. The last line of the program contains weighting factors which determine the program's strategy. They correspond to the F array and G array described in the October 1979 article. Changing these will make the computer play differently — experiment a little. These numbers are used by the computer to calculate a value for each possible playing location. You can see the values resulting from your changes on a second board as you play by making the following program modifications:

1. Type a line 419 identical to 410
2. Type a line 411 identical to 440
3. Type a line 412 identical to 450
4. Type line 413 PRINT PEEK (32000+J2);
5. Type a line 414 identical to 500
6. Type a line 415 identical to 510
7. Type a line 416 identical to 520

You should now be able to figure out how to program the computer to make germane remarks about the quality of its opponent's play. (Hint — line 270 causes the computer to do the evaluation. But notice that the computer's move is actually made in line 320. What if line 270 were repeated elsewhere, with the indicators peeked at in lines 280 and 290 zeroed out immediately afterward?)

The funny line numbers used for the data statements correspond to the memory locations into which the data is poked; for example, line 31420 contains data for memory locations 31420 to 31429. Knowing this, you can poke in different values to change strategies even while a game is in progress.

On the sample run, notice that the computer won the game by its eighth move, with which it formed two groups of three stones open at both ends. With the weighting values as shown, it likes to do things like that, so watch out! □

Sample Run

```
THE OBJECT OF THIS GAME IS TO
GET FIVE MARKERS IN A ROW.
WHOEVER DOES THAT FIRST, WINS.

YOU ARE X & THE COMPUTER IS O.
 0 - - - - - - - - - -
 9 - - - - - - - - - -
 8 - - - - - - - - - -
 7 - - - - - - - - - -
 6 - - - - - - - - - -
 5 - - - - - - - - - -
 4 - - - - - - - - - -
 3 - - - - - - - - - -
 2 - - - - - - - - - -
 1 - - - - - - - - - -
   1 2 3 4 5 6 7 8 9 0

DO YOU WANT TO MOVE FIRST ?N
MY MOVE IS  5, 5
 0 - - - - - - - - - -
 9 - - - - - - - - - -
 8 - - - - - - - - - -
 7 - - - - - - - - - -
 6 - - - - - - - - - -
 5 - - - - O - - - - -
 4 - - - - - - - - - -
 3 - - - - - - - - - -
 2 - - - - - - - - - -
 1 - - - - - - - - - -
   1 2 3 4 5 6 7 8 9 0

YOUR MOVE (ROW, COLUMN)
? 5 , 8
MY MOVE IS  6, 5
 0 - - - - - - - - - -
 9 - - - - - - - - - -
 8 - - - - - - - - - -
 7 - - - - - - - - - -
 6 - - - - O - - - - -
 5 - - - - O - - X - -
 4 - - - - - - - - - -
 3 - - - - - - - - - -
 2 - - - - - - - - - -
 1 - - - - - - - - - -
   1 2 3 4 5 6 7 8 9 0

YOUR MOVE (ROW, COLUMN)
? 8 , 5
MY MOVE IS  6, 7
 0 - - - - - - - - - -
 9 - - - - - - - - - -
 8 - - - - X - - - - -
 7 - - - - - - - - - -
 6 - - - - O - O - - -
 5 - - - - O - - X - -
 4 - - - - - - - - - -
 3 - - - - - - - - - -
 2 - - - - - - - - - -
 1 - - - - - - - - - -
   1 2 3 4 5 6 7 8 9 0
```

continued

Illustration by Donni Richman

```
YOUR MOVE (ROW, COLUMN)
? 5 , 10
MY MOVE IS  6, 6
 0 - - - - - - - - - -
 9 - - - - - - - - - -
 8 - - - - X - - - - -
 7 - - - - - - - - - -
 6 - - - - 0 0 0 - - -
 5 - - - - 0 - - X - X
 4 - - - - - - - - - -
 3 - - - - - - - - - -
 2 - - - - - - - - - -
 1 - - - - - - - - - -
   1 2 3 4 5 6 7 8 9 0
```

```
YOUR MOVE (ROW, COLUMN)
? 3 , 6
MY MOVE IS  4, 5
 0 - - - - - - - - - -
 9 - - - - - - - - - -
 8 - - - - X - - - - -
 7 - - X - - - - - - -
 6 - - X 0 0 0 0 X - -
 5 - - - - 0 0 - X - X
 4 - - - - 0 0 - - - -
 3 - - - - - X - - - -
 2 - - - - - - - - - -
 1 - - - - - - - - - -
   1 2 3 4 5 6 7 8 9 0
```

```
YOUR MOVE (ROW, COLUMN)
? 6 , 8
MY MOVE IS  6, 4
 0 - - - - - - - - - -
 9 - - - - - - - - - -
 8 - - - - X - - - - -
 7 - - - - - - - - - -
 6 - - - 0 0 0 0 X - -
 5 - - - - 0 - - X - X
 4 - - - - - - - - - -
 3 - - - - - - - - - -
 2 - - - - - - - - - -
 1 - - - - - - - - - -
   1 2 3 4 5 6 7 8 9 0
```

```
YOUR MOVE (ROW, COLUMN)
? 7 , 8
MY MOVE IS  3, 5
 0 - - - - - - - - - -
 9 - - - - - - - - - -
 8 - - - - X - - - - -
 7 - - X - - - - X - -
 6 - - X 0 0 0 0 X - -
 5 - - - - 0 0 - X - X
 4 - - - - 0 0 - - - -
 3 - - - - 0 X - - - -
 2 - - - - - - - - - -
 1 - - - - - - - - - -
   1 2 3 4 5 6 7 8 9 0
```

```
YOUR MOVE (ROW, COLUMN)
? 6 , 3
MY MOVE IS  4, 6
 0 - - - - - - - - - -
 9 - - - - - - - - - -
 8 - - - - X - - - - -
 7 - - - - - - - - - -
 6 - - X 0 0 0 0 X - -
 5 - - - - 0 - - X - X
 4 - - - - - 0 - - - -
 3 - - - - - - - - - -
 2 - - - - - - - - - -
 1 - - - - - - - - - -
   1 2 3 4 5 6 7 8 9 0
```

```
YOUR MOVE (ROW, COLUMN)
? 7 , 5
MY MOVE IS  2, 5
 0 - - - - - - - - - -
 9 - - - - - - - - - -
 8 - - - - X - - - - -
 7 - - X - X - - X - -
 6 - - X 0 0 0 0 X - -
 5 - - - - 0 0 - X - X
 4 - - - - 0 0 - - - -
 3 - - - - 0 X - - - -
 2 - - - - 0 - - - - -
 1 - - - - - - - - - -
   1 2 3 4 5 6 7 8 9 0
```

```
YOUR MOVE (ROW, COLUMN)
? 7 , 3
MY MOVE IS  5, 6
 0 - - - - - - - - - -
 9 - - - - - - - - - -
 8 - - - - X - - - - -
 7 - - X - - - - - - -
 6 - - X 0 0 0 0 X - -
 5 - - - - 0 0 - X - X
 4 - - - - - 0 - - - -
 3 - - - - - - - - - -
 2 - - - - - - - - - -
 1 - - - - - - - - - -
   1 2 3 4 5 6 7 8 9 0

I WIN !
YOUR SCORE ... WINS: 0
              LOSSES: 1
               DRAWS: 0

WANT TO PLAY AGAIN ? N

READY
```


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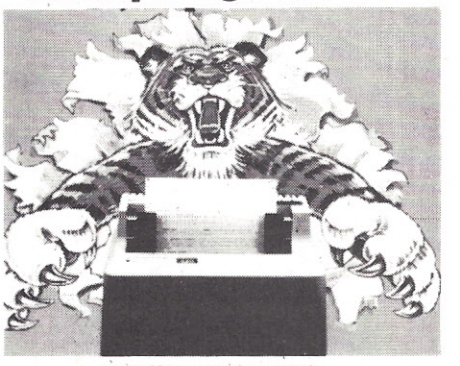
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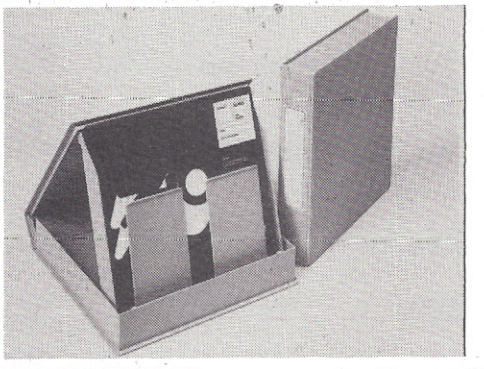
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CIRCLE 17

Program Listing

```
120 DEFINTA-Z

130 CLS:PRINT@220,"GO MOKU":PRINT
:PRINT"THE OBJECT OF THIS GAME I
S TO GET FIVE MARKERS IN A ROW."
:PRINT"WHOEVER DOES THAT FIRST W
INS.":PRINT"YOU ARE X & THE COMP
UTER IS O."

140 FORJ=31001TO31429:READK:POKE
J,K:NEXTJ

150 POKE16526,25:POKE16527,121:R
EM *** SUBROUTINE BEGINS AT

      31001 ... PROTECT 31000

160 FORJ=32000TO32400:POKEJ,0:NE
XTJ

170 BOARD=32300:REM *** THIS IS
BOARD'S ADDRESS MINUS 1

180 GOSUB 400

190 INPUT"DO YOU WANT TO MOVE FI
RST ";A$

200 IFLEFT$(A$,1)="N"THEN 270

210 PRINT"YOUR MOVE (ROW, COLUMN
)"

220 INPUTR,C

230 T=(R-1)*10+C

240 IFT>100ORT<1THENPRINT"ILLEGA
L MOVE ":GOTO 210

250 IFPEEK(BOARD+T)<>0THENPRINT"
ILLEGAL MOVE":GOTO 210

260 POKE(BOARD+T),1

270 XX=USR(0)

280 IFPEEK(32243)=2THENGOSUB 410
 :PRINT:PRINT"YOU WIN !";:HW=HW+
1:GOTO 560

290 IFPEEK(32203)=3THENPRINT:PRI
NT"THE GAME IS DRAWN.";:DD=DD+1:
GOTO 560

300 CLS

310 CM=PEEK(32201)

320 POKE(BOARD+CM),2

330 CR=INT((CM-1)/10)+1

340 CC=CM-10*(CR-1)

350 PRINT"MY MOVE IS ";STR$(CR);
",";STR$(CC)

360 GOSUB 410

370 IFPEEK(32203)=1THENPRINT:PRI
NT"I WIN !";:CW=CW+1:GOTO 560

380 POKE32244,1

390 GOTO 210

400 CLS

410 FORJ=9TO0STEP-1

420 IFJ<9PRINT" ";

430 PRINTJ+1;"= ";

440 FORJ1=1TO10

450 J2=J*10+J1

460 S0=PEEK(BOARD+J2)

470 IFS0=1PRINT" X ";:GOTO 500

480 IFS0=2PRINT" O ";:GOTO 500

490 PRINT" - ";

500 NEXTJ1

510 PRINT

520 NEXTJ

530 PRINT"      ";:FORJ=1TO10:PR
INTJ;:NEXTJ

540 PRINT

550 RETURN

560 PRINT"      YOUR SCORE ... W
INS:";HW;"  LOSSES:";CW;"  DRAWS
:";DD

570 INPUT"WANT TO PLAY AGAIN ";A
$:A$=LEFT$(A$,1)

580 IFA$="Y"THEN 160

590 END

31001 DATA22,0,33,1,125,6,100,11
4,35,5,194,32,121,58,244,125,254
,0,194,52,121,33,55,125,22,133,1
14,6,0,4,14,0,12,62,0,58,202,125
,120,214

31041 DATA1,22,9,95,131,21,194,6
9,121,129,58,245,125,121,254,3,2
50,100,121,254,9,242,100,121,62,
1,50,202,125,58,201,125,205,165,
121,120,254,3,250,126

31081 DATA121,254,9,242,126,121,
33,202,125,62,1,134,119,62,10,50
,201,125,205,165,121,58,202,125,
254,2,250,150,121,62,11,50,201,1
25,205,165,121,62,9,50

31121 DATA201,125,205,165,121,12
1,254,10,250,57,121,120,254,10,2
50,54,121,195,133,122,245,197,62
,0,50,205,125,58,206,125,58,207,
125,6,253,4,58,201,125,79

31161 DATA62,0,128,13,194,187,12
1,79,58,245,125,129,79,33,44,126
,35,13,194,201,121,126,198,1,79,
33,204,125,35,13,194,213,121,126
,198,1,119,120,254,2

31201 DATA194,180,121,58,206,125
,254,0,202,247,121,58,207,125,25
4,0,202,247,121,193,241,201,58,2
06,125,254,5,250,4,122,62,2,50,2
43,125,58,207,125,254,4

31241 DATA194,17,122,62,1,50,203
,125,58,206,125,254,0,194,48,122
,58,207,125,79,62,1,129,79,33,19
2,122,35,13,194,36,122,126,50,23
6,125,195,68,122,58

31281 DATA206,125,79,62,1,129,79
,33,187,122,35,13,194,59,122,126
,50,236,125,6,253,4,58,201,125,7
9,62,0,128,13,194,77,122,79,58,2
45,125,129,79,58

31321 DATA238,125,33,44,126,35,1
3,194,94,122,126,254,0,194,124,1
22,58,238,125,79,33,0,125,35,13,
194,112,122,126,79,58,236,125,12
9,119,120,254,2,194,70

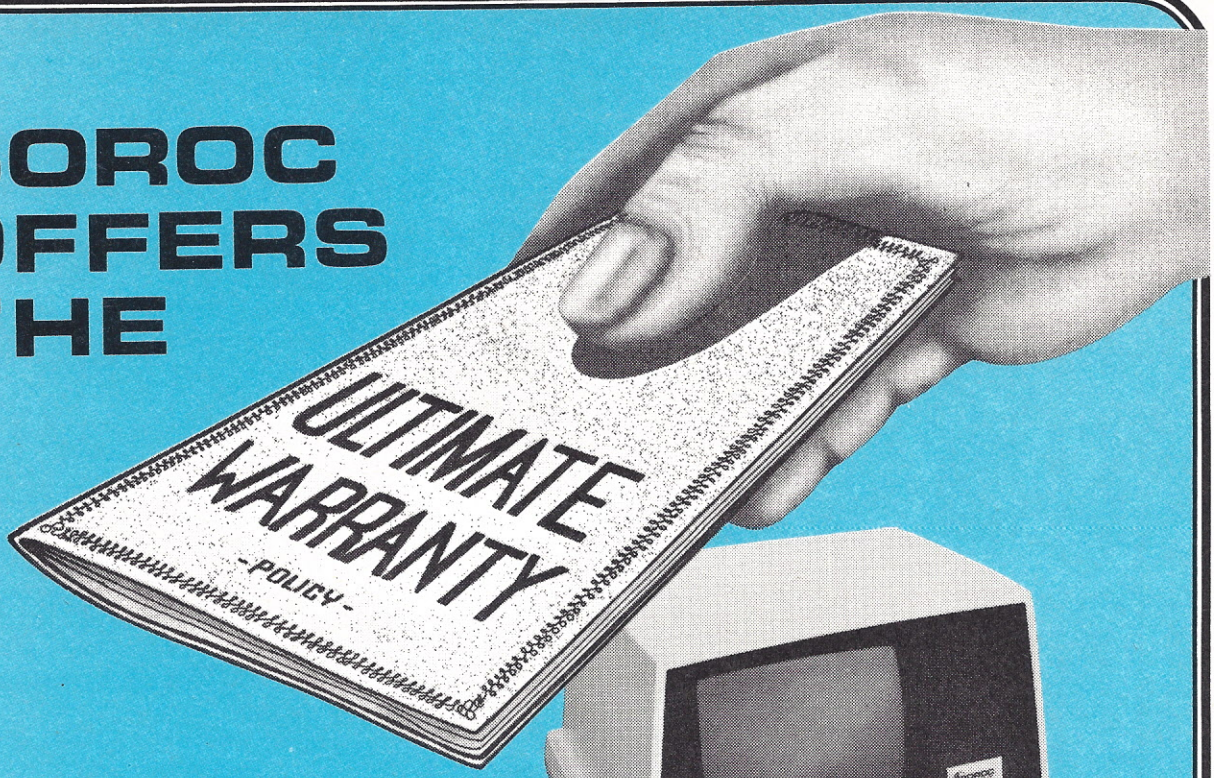
31361 DATA122,193,241,201,62,1,5
0,201,125,58,1,125,50,240,125,33
,1,125,6,1,4,35,58,240,125,79,14
5,242,167,122,121,58,240,125,120
,50,201,125,62,100

31401 DATA184,194,149,122,58,240
,125,254,0,194,186,122,62,3,50,2
03,125,201,0

31419 REM
            ***
NEXT LINE IS WEIGHTING FACTORS
            ***

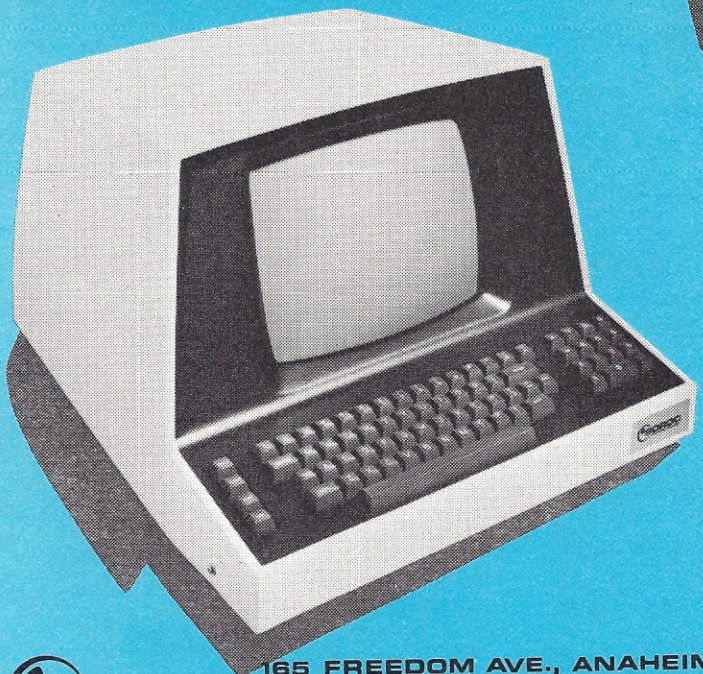
31420 DATA1,1,3,9,36,1,1,3,12,40
```

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CIRCLE 23

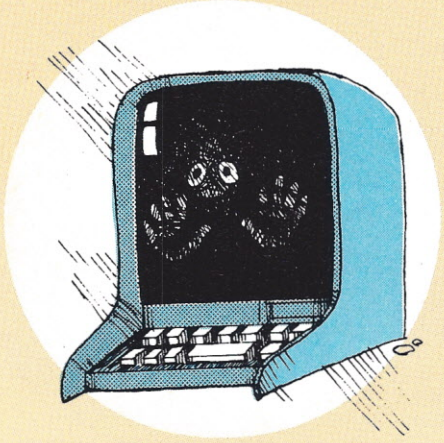
Software Update

BY DAVID LUBAR

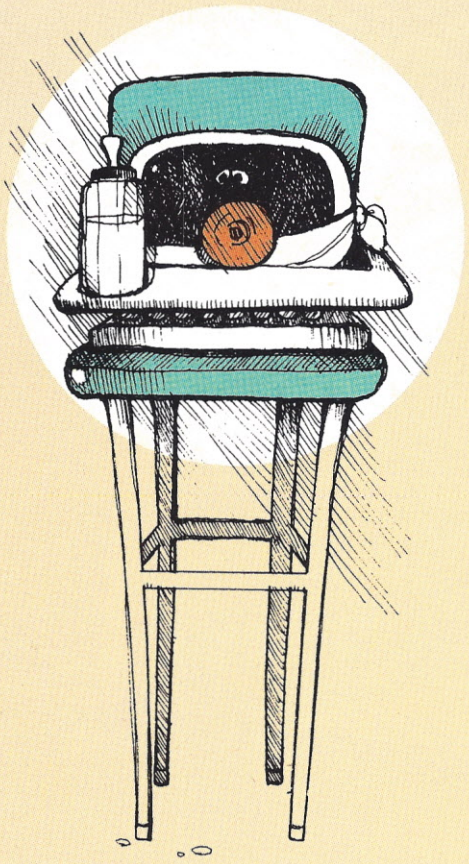
At last count, there were over 3000 new programs being offered per month for home computers. They range from slick packages with extensive documentation to strips of tape which the user has to splice into his own cassette. Following are reviews of some of the more interesting releases.

Pencil Adventure
By Shrayer and Adams
From Adventure Processes, Inc.
$22.50
For 48K Pet, TRS-80, Apple

Two creators of popular programs have pooled their talents to produce this exciting new game. In Pencil Adventure, you are lost in the mysterious depths of a memory-mapped video, and must search for treasures such as the Golden Manuscript and the Letterus Formus. But Beware! There are monsters lurking here, including Scrolls who will sweep you away to their dens, and Errs, hideous creatures that try to block your every move. Other hazards add excitement to the game. Watch out for the Wraparound; fall in here and you'll be carried back to where you started.



All in all, this is an exciting, interactive game, and it will probably take its place among software classics. Highly recommended.



Companion
By U.N. Needed
From AI Implementations $799.95
For SWTP systems

This combination software/hardware package allows the computer to join you for dinner. A grinding, chewing, swallowing unit, containing enzymes and hydrochloric acid, acts as the computer's mouth and stomach. Software allows it to comment on the food and make dinner conversation. Variations include Gourmet, where the comments are highly discerning, and Baby, where the unit must be fed one spoonful at a time and will often refuse to eat unless the user tastes some himself or makes silly noises. Though this is an expensive package, it's refreshing to see computers being put to new and practical uses.

Lunar Launcher
By Ed Nasa
One Small Step Co. $5.95
For 4K TRS-80 LI

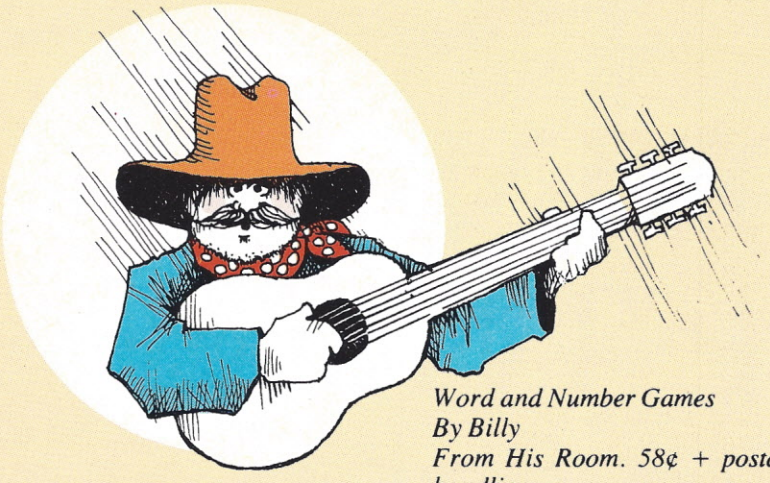
The object of this game is to get your rocket (a small square) off the moon (a horizontal line) and up to the stars (more small squares). Launching is achieved by pressing any key. Speed is controlled by the computer. If you forget to press a key, the rocket won't launch. Recommended for children under 5 and for persons who hate to lose.

Super Simulation
By Dr. Marvin Marvin
From Grantgrabber Labs $29.95
For OSI C4P MF

Simultations are one of the most popular areas of computer games. This disk contains four rather creative examples. In Planeria, you must try to create a large colony of flatworms, starting with a single worm and a sharp knife. In Planeria II, the object is to get as many heads as possible on one worm, while maintaining enough food for each head. Apartment is a simulation in which you try to control a roach population while attempting not to spoil the decor of the kitchen or poisoning yourself. This one is tough and exciting. Finally, there is Grant. You are a scientist trying to get money for projects while not losing too much free time. These unusual games are lots of fun.



Illustrated by Jacky Brill



Sound Games
By Barbi and Ken Doll
From Cottage Concepts $15.95
For 16K Apple

As the title implies, these games make extensive use of the Apple's internal speaker. In Pong, the computer produces the sound "pong" whenever a key is depressed. (If the user is depressed, nothing happens.) The second game, Ping-Pong, is similar to Pong, but produces two sounds. While rather boring by themselves, these games might be used as subroutines in your own programs.

Word and Number Games
By Billy
From His Room. 58¢ + postage and handling
For 1K Kim

This C2 cassette (I didn't know they made them that short) comes with one game on each side. 2001 is a number game. The Kim prints a random number from 0 to 2000 on its LED display. You have to enter a number which, when added to the Kim's number, will result in a total of 2001. If you lose, you get another try. The other game, Boston, requires a video or printer. The player and computer take turns naming cities. The first to name Boston wins. While these games aren't exactly great, you can't beat the price.

Batch of Basik Gamez
By T.W.
From Rippoff, Ltd. $78.95
One size fits all

The author of this cassette, who, for some reason, prefers to remain anonymous, has assembled a collection of games in Basic. Some of the games seem slightly familiar, though this could be mere coincidence. Included are Guess the Vegetable, Car Trek©, Master Beagles, Hurple, Bewari and others. Documentation is on two 3 × 5 file cards. The cassette is strangely labeled. My copy said "Greatest Hits of Hank Williams," and snatches of "Your Cheating Heart" could be heard between programs. The tape failed to load after 100 tries at different volume and tone settings. A call to Rippoff, Ltd., produced the information that their number is no longer in use. Not recommended unless you like Country and Western music.

That wraps up the reviews. To receive more information, send me $200 (or the equivalent in Swiss Francs) and I'll send you a complete list as soon as my printer arrives from Commodore.□

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CIRCLE 24

MOVING UP TO lower case

BY DAVE ROSE

Shucks, let's admit it. We TRS-80 owners are special. We have so much to choose from in the way of new peripherals, hardware, software and firmware. If you are anything at all like the rest of us TRS-80 owners, you have your own personal list of future goodies just waiting for the right money to come along.

Ever thought about lower case? A lower case modification may not be on *your* list at all, but there are some very good reasons why perhaps it should be. I'll be talking more about that later. Then again, you may have known all along that you would eventually be taking the LC plunge . . .

Why lower case? A good question. If your interests in personal computing lie only in the areas of games and/or Basic language programming, then you may see no particular advantage in having a lower case capability. However, if you plan to be involved in any way in applications, then you should really give some serious thought to lower case. This especially applies if the application will be in an office environment; all caps can annoy the uninitiated. Naturally, upper/lower case displays are much less straining to the eyes. They also aid text comprehension and make reading easier. Indeed, therein lies an excellent reason for considering lower case even if you aren't going to be concerned with an "outside" user. Computer prompts and responses become much more personal when not made all in caps.

Of course, any application, office or otherwise, which incorporates word or text processing should by definition include a lower case capability. Just try to imagine a useful, effective word processor without lower case.

Once you've made the decision to purchase a lower case modification (or "mod" for short) for your TRS-80, you'll need to consider several factors. Not the least of these is *which* mod to buy. Should you invest in the new Radio Shack modification, or in one of those mail-order mods advertised in the pages of most microcomputer magazines? The difference in price is substantial. Radio Shack charges around $100 for their mod, while the average mail-order modification costs about $30. Obviously, there are reasons for the difference, and I'll explore some of them with you.

Installation Considerations

Here Radio Shack has it all over the mail-order folks, particularly if you're not a hardware type. The Radio Shack mod is installed in their usual manner; simply bring in your keyboard, leave it a while, pay, and go home with a tested, guaranteed lower case modification. This system has several distinct advantages over the mail-order mods; it can be installed in a matter of days, usually one day in the larger metropolitan areas (providing, of course, the local Radio Shack service center has the required part in stock), and you can be assured that the new mod has been tested and is working perfectly right from the first.

In the mail-order case however, the mod may not arrive for as long as two weeks, and then success depends totally upon your abilities in the hardware department (soldering without overheating the components, etc.). In some cases the parts themselves are not actually included with the instructions, so you spend additional time and trouble shopping around for the right selection of parts. I can personally testify as to the frustration involved in *that* little exercise.

It's important to remember that most of the mail-order mods cost a lot less than the Radio Shack version, and if hardware is your thing, installation really is quite simple. Care in terms of static, heat damage, and so forth is necessary, but probably second nature to you if you're a real hardware buff.

Using the Mod

Methods for invoking the lower case capability vary from one mail-order mod to the next. Some use software control, while others go the hardware route (a switch). Some do away with the TRS-80's graphics abilities in favor of lower case. RAM is used in some cases, not at all in others. Anyone in the market for a mail-order mod should take care to notice exactly what is included, and what will be needed in terms of memory.

The Radio Shack modification uses the software approach. The lower case driver is a machine-language program with a few interesting twists of its own. When activated, it locates itself to the highest available location in RAM (changing its own internal memory references accordingly), then adjusts the MEMORY SIZE indicator to the new amount. This is nothing short of an inspiration to those of us who really get

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CP-184

CIRCLE 77

a rush out of seeing a truly self-modifying piece of software at work. Once initialized, the program becomes part of the keyboard scan, and is almost totally transparent to the system.

Shift-0 serves as a toggle to activate the lower case driver. Pressing Shift-0 causes lower case to be displayed normally and upper case to be displayed with use of the Shift key, as one would expect. Pressing Shift-0 again causes the computer to behave exactly as it did without the mod. This then gives the Shift-0 key a Shift-lock function, also quite handy. The total memory requirement for the driver program is 525 bytes.

The computer seems to react quite naturally to the Radio Shack mod, recognizing commands in either upper or lower case, and making its responses using proper upper/lower case syntax. For instance, the TRS-80 responds to an out-of-memory condition in step 70 with "Out of Memory in 70" with lower case and capital letters in all of the right places. The computer responds in like fashion to some of the mail-order modifications and not at all to others. I haven't found mention of this particular aspect in anyone's advertisements, including Radio Shack's.

The Display Itself

Display is a consideration of particular importance in my opinion. In almost all of the mail-order or do-it-yourself mods that I've seen or heard about, the lower case letters use only the upper two-thirds of the line display space. This is the same display area used by the upper case characters. In other words, when a lower case letter occurs which should descend below the normal print line, it doesn't. For instance, a lower case "p" will give the appearance of a smaller version of a capital "P", rather than descend below the print line as you would expect a lower case "p" to do. While this may be a minor inconvenience, it does take some getting used to, especially in word processing applications. This problem has been one of the complaints with the Electric Pencil (an excellent word processor, by the way). The letters which will appear strange until one gets used to them are "g", "j", "p", "q" and "y".

The Radio Shack version displays "true descenders", that is, the aforementioned lower case letters *do* extend below the print line. When it comes to readability, this is a major plus for the Tandy mod.

Use With Other Software

Suddenly we find things getting a bit sticky. Certain types of fairly popular user software will just not work with the Radio Shack modification (for instance, Electric Pencil). In fact, Radio Shack admits in their little documentation book that the R/S mod doesn't even work with all of *their* software! The problem is just as bad or worse in the other direction. Many of the mail-order mods are so specialized that they are guaranteed to work correctly with only a single piece of software. No doubt the quiet of the night somewhere harbors that dedicated individual who is even now developing the software patch which will take care of this problem, hopefully both ways. A salute to you, oh backbone of microcomputing. . .

Know What You Need

Meanwhile, the question of making a choice still looms, with some fairly stiff penalties for error (believe me). My advice is this: do your homework! Be aware of your possible future needs as well as your present requirements. Don't buy anything without taking the time to do some serious research.

The Radio Shack mod is the obvious choice if you intend to buy their new word processor package (for which it was designed). The RS mod would also seem the best choice if you have $100, and nothing more in mind than enhanced readability and system compatability.

A mail-order or do-it-yourself type lower case modification would be a good choice if you really want lower case, don't mind a little hardware workout, and find most of your allowance already spent. If this sounds like you, let me again caution you — know what you are getting. Having fulfilled that one condition, you may be able to find something perfectly suited to your needs for a lot less than Radio Shack prices.

One last word of advice: if you know that a particular piece of software lies in your future (a text formatter, for example), by all means peruse the documentation associated with that software before making any lower case decisions. Practically all of the more reputable software dealers sell their documentation separately for a small fee, and the cost will more than justify itself by returning to you the warm glow of certainty that comes from knowing what the devil you're doing.□

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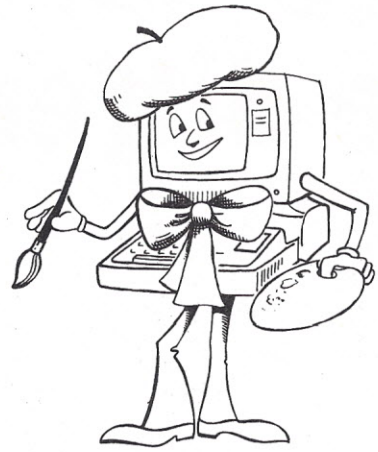
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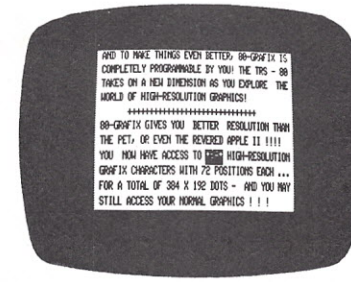
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CIRCLE 19

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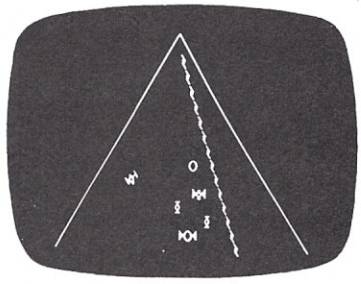


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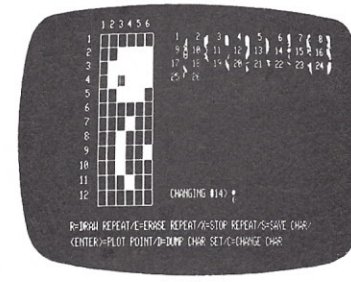
DEMONSTRATION PROGRAMS
The 80-GRAFIX board is supplied with a Character Generator software and several demonstration programs.

FINALLY, AT LAST. . .

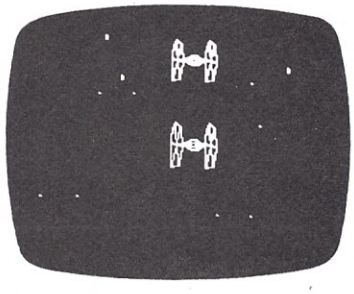
HI- RESOLUTION GRAPHICS is available for your TRS-80 computer system. The 80-GRAFIX board from PROGRAMMA International, Inc. gives your TRS-80 high resolution capability that is greater than the Commodore CBM/PET or even the revered APPLE II.

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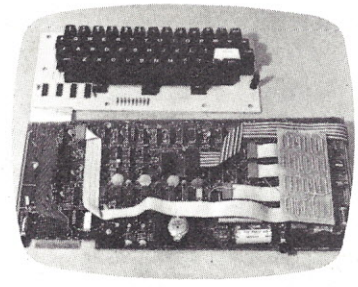
The 80-GRAFIX board is simple to install (note that this voids your Radio Shack warranty), and programming is done through BASIC. 80-GRAFIX opens up a whole new realm of software development and excitement never dreamed of for the TRS-80!



CHARACTER GENERATOR
The supplied character generator software allows you to create your own character set of up to 64 original characters.



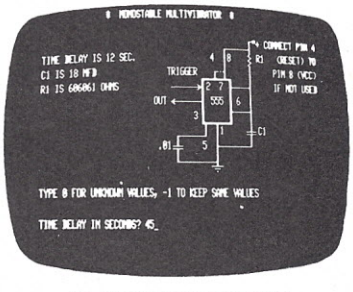
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With the 80-GRAFIX board you can write exciting real-time games using BASIC.



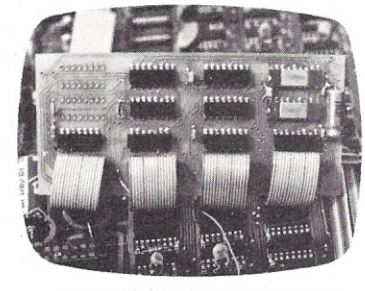
EASY INSTALLATION
The 80-GRAFIX board is simple to install and fits inside the TRS-80 case.



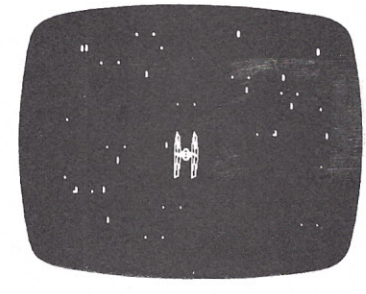
GRAPHICS GALORE
The 80-GRAFIX board and the supplied Character Generator allow you to become an artist.



ELECTRONIC DESIGN
The 80-GRAFIX board has unlimited application in Electronic design and Education.



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CIRCLE 18

Dear Diary. . .

BY M. BLAIR SIBLEY

Diary, a program for recording your innermost thoughts, was written for a Sol Terminal Computer with 32K of memory, North Star disk drive and North Star Basic Version 6, Release 3.

The program, which runs in approximately 10K of memory, has three major routines: initialization of the diary; writing a file entry; and reading a file entry.

Initialization of Diary sets the parameters of the file. In this case, I wanted the file to contain the number of entries in the file to make accessing easy, dates to facilitate reviewing a particular entry and finally the entries themselves.

I assigned the variable J to the number of entries in the file and represent J in 2 bytes. D$ represents the date entries with each date being an 8-byte segment of D$. The length of this string is determined by the number of entries in the diary (99), times the length of each segment (8 bytes). Thus, D$ will be $99 \times 8 = 795$ bytes long. North Star Basic requires the addition of 3 bytes to each string over 256 bytes so the total of D$ is 798 bytes.

Finally, the actual diary entries are limited to 10 lines of 60 characters each. I find this ample space for a daily entry. The 600 bytes for each entry is assigned to A$. Again, 3 bytes are added to the string, giving a total of 603 bytes.

The above information provides the formula for accessing any diary entry in the file. Random access in North Star Basic is accomplished by "jumping over" files not desired. The "jump" number, assigned to F, is determined by $2+798+(603 \times Z)+1$. The "1" is required to start at the beginning of the file accessed. The variable Z is the number of files to skip.

Single-sided North Star disks have 350 sectors of 256 bytes each. To determine the number of sectors required for the diary file, the number of bytes in the total file (approximately 60,000) is divided by 256, giving approximately 240 sectors. The file's 240 sectors plus Basic's 45, DOS's 10, and the program's 12, fill up most of a disk.

Basically, all the initialization routine at lines 245 to 310 does is write the variables J and D$ and then the variable A$ 99 times. The "Fill" statements allow a flashing asterisk during initialization by using the Sol's memory mapped video.

The second major program routine is in lines 535 through 690; it allows the writing of a file entry. In North Star Basic, a string is accessed character by character. Lines 560 to 600 break the A$ string into units of 60 characters each, which is the line length for each entry. Line 575 places a mark on the 60th character of the line so it is not accidently overwritten. Line 585 allows terminating an entry before all ten lines are used up by typing a "*" in the first space of a new line. Line 685 clears all that was in the A$ so subsequent entries during the same run of the program will not contain previously entered data.

The final routine mentioned, which allows viewing previous file entries, is in lines 315 through 530. Line 375 to 405 break the 795-byte long D$ into 8-byte blocks so that date entries appear separately. I recommend the form 12>30>79 but any 8-byte-long way of writing the date will do.

A few notes about North Star Basic:

- The "!" is shorthand for the PRINT statement.
- Reading and writing to disk is done in random access mode, accomplished by "jumping" the number of bytes specified by the variable following the "%"(in this case F).
- The "noendmark" at the end of each read or write operation inhibits the writing of an endmark, making the calculations of the file lengths easier.
- Finally, CHR$(11) clears the screen for a cleaner looking output. □

Illustration by Susan Genser

Program Listing

```
100 REM DIARY PROGRAM BY M.Blair Sibley,1979.
105 DIM A$(603),D$(795)
110 N=99\REM THIS IS THE NUMBER OF ENTRIES PER FILE
115 V1$=CHR$(11)\REM THIS CLEARS THE SCREEN
120 !V1$
125 FOR V=1 TO 6\!\NEXT V
130 !"           F O R  A U T H O R I Z E D  E Y E S"
135 !
140 !
145 !"                          O N L Y"
150 FILL 52928,32
155 FOR V = 1 TO 1000 \NEXT
165 !V1$
170 !"     This diary program has three functions:"
175 !
180 !"        V = View an entry in the diary"
185 !
190 !"        W = Write an entry to the diary"
195 !
200 !"        S = Stop the program"
205 !
210 !
215 INPUT"Please input the desired function : ",Z$(1,1)
220 IF Z$(1,1)="I" THEN 245
225 IF Z$(1,1)="V" THEN 315
230 IF Z$(1,1)="W" THEN 535
235 IF Z$(1,1)="S" THEN GOTO 715
240 !"Wrong entry, try again."\GOTO 170
245 REM THIS WILL INITIALIZE THE SYSTEM
250 J=1
255 !V1$
260 !"As long as the `*' is flashing, all is well."
265 OPEN #1,"DIARY"
270 WRITE #1,J,D$
275 FOR G=1 TO N
280    FILL 52304,42
285    WRITE #1,A$
290    FILL 52304,32
295    FOR X7=1 TO 100\NEXT X7
300 NEXT G
305 CLOSE #1
310 GOTO 165
315 REM THIS WILL READ A FILE AND PRINT IT OUT
320 !V1$
325 !"   The following is the list of entries made to date"
330 !"on this file.  After they have printed out, choose the"
335 !"one you wish to see.  If you don`t want to see any"
340 !"type `NONE'."
345 !
350 !
355 OPEN #1,"DIARY"
360 T=1
365 READ #1%0,J,D$
368 X=0
370 FOR Z=1 TO J
375    S=T+7
380    !D$(T,S)," ",
385    X=X+1\ IF X=5 THEN 390 ELSE 395
390    X=0\!
395    T=T+8
400 NEXT Z
```

Sample Run

```
          F O R  A U T H O R I Z E D  E Y E S

                          O N L Y

     This diary program has three functions:

        V = View an entry in the diary

        W = Write an entry to the diary

        S = Stop the program


Please input the desired function : W

You have ten lines in which to type your message.

 1                                                                    :
?   As I filled up my car with the expensive stuff today I
 2                                                                    :
?became amazed at the ingenuity of the people in control
 3                                                                    :
?in keeping my mind so preoccupied with the problems of
 4                                                                    :
?supply that I had little time to worry or get mad about the
 5                                                                    :
?outrageous price.  God help us if the proponents of
 6                                                                    :
?Nuclear Power learn the same trick.  I fear the price
 7                                                                    :
?would be much to dear.
 8                                                                    :
?*

Dates are to be typed numerically (1>1>79).

What is the date of this entry ? 6>25>79

This is the 18 entry into this file.

     This diary program has three functions:

        V = View an entry in the diary

        W = Write an entry to the diary

        S = Stop the program
```

```
405 REM THIS WILL ALLOW THE CHOOSING OF A DATE TO PRINT
410 !\!
415 INPUT "Which date would you like to see ? ",D1$(1,8)
420 IF D1$(1,4)="NONE" THEN 422 ELSE 425
422 CLOSE #1\GOTO 165
425 T=1
430 FOR Z=1 TO J
435     S=T+7
440     IF D1$(1,8) = D$(T,S) THEN EXIT 465
445     T=T+8
450 NEXT Z
455 !"There is an error.  Dates must be typed exactly as above."
460 !"Please try again."\GOTO 415
465 REM READ AND PRINT THE DESIRED FILE
470 Z=Z-1
475 !V1$
480 !"The date for this entry is ",D1$(1,8)
485 !\!
490 F=801 + (603*Z)
495 READ #1%F,A$
500 FOR Z=1 TO 600 STEP 60
505     !A$(Z,Z+59)
510 NEXT Z
515 !\!\INPUT"Type a carriage return to return to functions ",A1$
520 CLOSE #1
525 !V1$
530 GOTO 165
535 REM THIS WILL ALLOW THE WRITING OF AN ENTRY
540 !V1$
545 D=0
550 !"You have ten lines in which to type your message."
555 !
560 A=1
565 D=D+1
570 IF D=11 THEN 600
575 !D,TAB(60),"!"
580 INPUT A$(A,A+59)
585 IF A$(A,A)="*" THEN 600
590 A=A+60\GOTO 565
600 REM A$ HAS NOW BEEN LOADED AND IT IS READY TO SAVE TO DISK
605 !
610 !"Dates are to be typed numerically (1>1>79)."
615 !
620 INPUT"What is the date of this entry ? ",D1$(1,8)
625 OPEN #1,"DIARY"
630 READ #1%0,J,D$
635 !
640 !"This is the",J," entry into this file."
645 IF J>N  THEN 695
650 D$(J*8+1,J*8+8)= D1$(1,8)
655 F= 801 + (J*603)
660 WRITE #1%F,A$,NOENDMARK
665 J = J + 1
670 WRITE #1%0,J,D$,NOENDMARK
675 CLOSE #1
685 FOR T=1 TO 600 STEP 10\A$(T,T+10)="            "\NEXT T
690 GOTO 165
695 !"The legnth of the diary file will be exceeded by"
700 !"this entry.  It is thus time to start a new diary"
705 !"file."
710 GOTO 165
715 CLOSE #1
720 !V1$
725 !"End of program."
730 FOR V=1 TO 500\NEXT
735 !V1$
740 END
Ready
```

```
Please input the desired function : V

   The following is the list of entries made to date
on this file.  After they have printed out, choose the
one you wish to see.  If you don't want to see any
type 'NONE'.


          4>25>79   4>28>79   4>30>79   5>3>799
5>4>799   5>15>79   5>16>79   5>17>79   5>20>79
5>23>79   5>28>79   5>30>79   6>2>799   6>8>799
6>11>79   6>15>79   6>16>79   6>25>79

Which date would you like to see ? 6>25>79

The date for this entry is 6>25>79


   As I filled up my car with the expensive stuff today I
became amazed at the ingenuity of the people in control
in keeping my mind so preoccupied with the problems of
supply that I had little time to worry or get mad about the
outrageous price.  God help us if the proponents of
Nuclear Power learn the same trick.  I fear the price
would be much to dear.


Type a carriage return to return to functions

     This diary program has three functions:

        V = View an entry in the diary

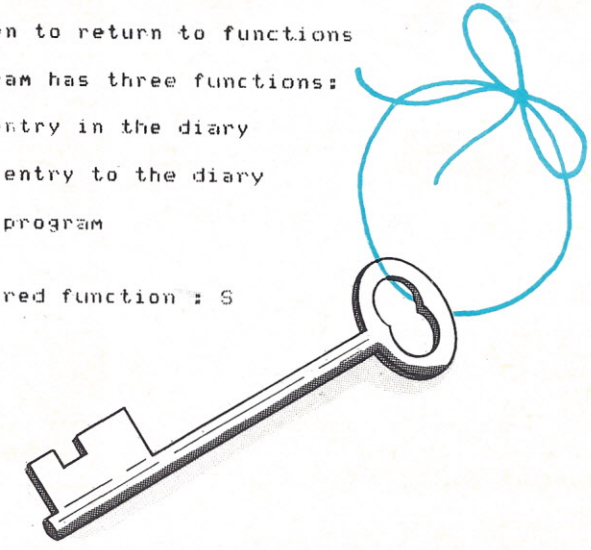
        W = Write an entry to the diary

        S = Stop the program

Please input the desired function : S

End of program.

READY
```



Fastmath

BY R.P. FORD AND J.G. SPARTI

With the beginning of a new school term it was fortuitous that a friend of mine bought a new computer system and leased his old one to me. I wanted to help both my elementary grade children but my busy schedule wouldn't allow it. Then the idea of using the computer as a surrogate tutor in mathematics came to me.

After consulting with teachers and many hours of programming, additional sections for presentation of the data were formatted so the children could easily see and respond.

Although a child could run the program, a parent, tutor or guardian can change the parameters of how many problems to present or the length of time the child may work before he/she is interrupted and scored.

Problems are presented vertically rather than horizontally to allow the child to grasp the problem in a more familiar format. Errors are caught right after input of the erroneous digits.

Adjustment of problems for grade levels are made allowing a child harder and harder problems each year. A printed listing of how well the child did on various levels of difficulty can help the parent determine the problem areas of the child.

Answers are inputted in a right-to-left form making a child add column by column.

My computer consists of a PolyMor-

```
* Do you want a Time Limit NO
* Ok, Then the user can only
  answer a set no. of questions

*Maximum no. of questions <20> 1000
Too Large - 100 Maximum
*Maximum no.of questions <20> 4
```

Figure 1

```
 Hi, What's your Name
ROY HUNTER Thank you ,ROY

ROY - You will have 4 problems
to answer

    To help you out , when
answering the problems you will
not have to press the return
key  Hit any key to continue..
```

Figure 2

```
Type answers as ones,tens
& hundreds

For example
An answer of 47 would be
typed in as '7' and '4'

What grade are you in ROY: 3
```

Figure 3

```
4 problems left          27
                       +  12
                       =   8
```

Figure 4

```
4 problems left     27
                  +  12
                  = BOOOOOOO!!!!
 Try again          You blew it !!
  Try again           49
```

```
4 problems left   27
                +  12
                = BOOOOOOO!!!!
 Try again        You blew it !!
Try again       You can do better
 The correct answer is  39
```

```
4 problems left          14
                       +  7
                       =
                          21
```

Figure 7

```
3 problems left          17
                       +  11
                       =  28
```

Figure 8

```
2 problems left          50
                       +  43
                       =  83
```

Figure 9

```
2 problems left          50
                       +  43
                       = Wrong
Try again                93
```

Figure 10

```
1 problems left          13
                       +  30
                       =  43
```

Figure 11

```
0 problems left          30
                       +  52
                       =  82
```

Figure 12

```
 Well,ROY
There were    9 Problems given
Of which you answered    5
correctly for a percentage
of  55.6 %
Better luck next time
```

Figure 13

```
 Prob.  Difficulty  Time    Correct
     1        48     129.0   Wrong
     2        48     176.0   Wrong
     3        48     201.0   Wrong
     4        30     194.0   Right
     5        40    1785.0   Right
     6        48    1868.0   Wrong
     7        48    1910.0   Right
     8        28    2166.0   Right
     9        40    1935.0   Right

TOTAL POSSIBLE SCORE =  558
YOUR SCORE =  378
```

Figure 14

Program Notes

Lines 10 to 40 reserve array and string space and initialize the random number generator. Line 70 asks for the child's name. If a CTRL/P (ASCII value 16) is entered the program branches to the "Parent's Section" (lines 1160 to 1270). Here, the parameters for the session may be reset to the desired maximum.

Lines 100 to 150 examine the input for a first name so that a more personal session is obtained. If a blank name is input, the name 'NONAME' is substituted. Printing of preliminary instructions and number of problems (or seconds) is within lines 160 to 280. With Lines 290 to 420 a grade level is requested, checked if valid and a slightly humorous reply is given if the level exceeds fourth grade.

In lines 430 to 450 an adjustment is made for grade levels less than 1 (primary or kindergarten level) and grade levels greater than fourth. Lines 460 to 540 allow the system to calculate an answer and present it on the screen, while lines 550 to 600 accept the answer and print an error message if an incorrect digit or invalid character is received.

Subroutines, data statements and functions start at line 690 and end at line 1130.

Function FNP on lines 690 to 730 allows a message to be printed on the screen at location (HO, VO). Function FNN on line 740 generates an integer random number within the range of 0 to K6-1. Function FND within lines 750 to 830 is used to calculate a difficulty value for a number.

The subroutines starting on lines 840 and 930 respectively are used to subdivide the number into its separate digits and accept and check the input, digit by digit.

The DATA statement at line 1040 is used for the maximum addend per grade level while the DATA statements following it are error messages that may be printed if a wrong input has been detected.

The program section within lines 1141 to 1159 is used to print out the accummulated information on each problem (difficulty, whether right/wrong, amount of time used) to give a parent an overview on the areas of difficulty a child is having. □

Program Listing

```
10 DIM L$(1:3),N$(1:30),B$(1:30),S$(1:1),X$(1:1)
20 DIM P8(150,3)
30 DIM G0(6),D(3),M$(8:35)\MAT READ G0\MAT READ M$
40 DIM U$(1:35),S(2)\RANDOMIZE\X$=CHR$(13)\S$=CHR$(12)
50 B$=" "\M5=7\S(1)=0\S(2)=120
60 B$=B$+B$\IF LEN(B$)<30 THEN 60
70 PRINT S$,X$,TAB(5),\INPUT1 " Hi, What's your Name ",N$
80 L=LEN(N$)\IF L=0 THEN 140
REM ********************************************************
REM *                                                      *
REM *            Hitting a CTRL/P now                      *
REM *          will cause a Jump to the                    *
REM *           Parent's section                           *
REM *                                                      *
REM ********************************************************
90 IF ASC(N$)=16 THEN 1160
100 FOR I=1 TO LEN(N$)\IF MID$(N$,I,I)<>" " THEN EXIT 120
110 NEXT\N1=L\GOTO 160
120 FOR J=I TO L\IF MID$(N$,J,J)=" " THEN EXIT 150
130 NEXT\N1=L\GOTO 160
REM ********************************************************
REM *                                                      *
REM *            Check for a blank Name                    *
REM *                                                      *
REM ********************************************************
140 N$="NONAME"\J=7
150 N1=J-1
160 PRINT " Thank you ,",LEFT$(N$,N1),X$
170 PRINT "  ",LEFT$(N$,N1)," - You will have ",
180 IF S(2)=0 THEN 210 ELSE PRINT S(2)," seconds"
190 PRINT "to answer as many Problems as possible.",X$
200 GOTO 220
210 PRINT S(1)," Problems to answer"
220 PRINT "   To help you out , when answering the"
230 PRINT "Problems you will not have to Press the return key"
240 PRINT "Hit any key to continue..",\WAIT
250 PRINT X$,S$\PRINT " Type answers as ones,tens & ",
260 PRINT "hundreds"\PRINT\PRINT " For example"
270 PRINT " An answer of 47 would be typed in as '7' and",
280 PRINT " '4'"
290 PRINT\PRINT "What Grade are you in ",LEFT$(N$,N1),
300 INPUT ": ",A$
310 IF LEN(A$)>0 THEN 330
320 PRINT "Come ON Give me SOME answer !!"\GOTO 290
330 FOR I=1 TO LEN(A$)
340 IF ASC(A$,I)<48 OR ASC(A$,I)>57 THEN EXIT 360
350 NEXT\GOTO 370
360 PRINT "Look - I can only understand numbers!!!"\GOTO 290
370 G=VAL(A$)\IF G<5 THEN 410
380 PRINT "Kind of OLD to be learning addition aren't you?"
390 PRINT "But that's alright - I've flunked BASIC before too",
400 PAUSE 60\PRINT " Only kidding"\PAUSE 120
410 PRINT S$,X$,"  All right - when you're ready to go - "
420 PRINT\PRINT "Press any Key..",\WAIT\P7=0
430 IF G<6 THEN G1=G ELSE G1=6
440 IF G=0 THEN G1=1
450 IF G1<5 THEN G2=6-G1 ELSE G2=2
930 REM ** Get Input **
940 E=0\E5=36-M6
950 FOR I9=M6 TO 1 STEP -1
960 A9=INP(1)\A9=A9-48\U$=CHR$(A9+48)\X=FNP(U$,L,E5+I9)
970 IF A9<>D(I9) THEN EXIT 990
980 NEXT\GOTO 1000
990 E=1
1000 T=T-INT(TIME(0)/60+.5)\P7=P7+1\P8(P7,1)=D5
1020 P8(P7,2)=ABS(T1-T)\P8(P7,3)=1-E
1030 RETURN
1040 DATA 9,25,54,100,150,250
1050 DATA "Wrong"
1060 DATA "You can do better"
1070 DATA "BOOOOOOO!!!!"
1080 DATA "What was that"
1090 DATA "You have to do better"
1100 DATA "Wrong number"
1110 DATA "You blew it !!"
1120 DATA "You're not thinking","Do Better Next Time"
1130 REM DATA "Dumb Attack Time"
1140 PRINT CHR$(12)
REM ********************************************************
REM *                                                      *
REM *     Listing of Problems,Difficulty &                 *
REM *     No. Problems Solved                              *
REM *                                                      *
REM ********************************************************
1141 FILE:2,LIST\S5,S6=0
1142 PRINT:2,X$,TAB(6),"Prob. Difficulty Time Correct"
1143 FOR I=1 TO P7
1144 IF S(1)=0 THEN G6=(G2-P8(I,2))/G2+1 ELSE G6=G1
1145 S5=S5+P8(I,3)*P8(I,1)*G6\S6=S6+P8(I,1)
1146 PRINT:2,TAB(5),%6I,I,%7I,P8(I,1),%9F1,P8(I,2),
1149 IF P8(I,3)=0 THEN A$="Wrong" ELSE A$="Right"
1150 PRINT:2,"    ",A$
1151 NEXT
1152 PRINT:2,"TOTAL POSSIBLE SCORE = ",S6
1153 PRINT:2,"YOUR SCORE = ",S5
1159 GOTO 1280
REM ********************************************************
REM *                                                      *
REM *                Parent's Section                      *
REM *              This section allows a Parent            *

REM *            or Guardian,teacher,etc. to set           *
REM *            the limits the child will be Graded       *
REM *            against.                                  *
REM *                                                      *
REM ********************************************************
1160 PRINT\PRINT S$,X$\MAT S=0
1170 INPUT "* Do you want a Time Limit ",A$
1180 IF LEFT$(A$,1)="Y" THEN 1250
1190 PRINT "* Ok, Then the user can only answer a set ",
1200 PRINT "no. of questions"\PRINT
1210 INPUT " *Maximum no. of questions <20> ",A$
1220 IF LEN(A$)=0 THEN S(1)=20 ELSE S(1)=VAL(A$)
1230 IF S(1)>100 THEN PRINT "Too Large - 100 Maximum"\GOTO 1210
1240 GOTO 1270
1250 PRINT\INPUT "*Time limit(in seconds) <120> ",A$
1260 IF LEN(A$)=0 THEN S(2)=120 ELSE S(2)=VAL(A$)
1270 GOTO 70
1280 REM
```

```
460 PRINT TIME(0),S$\L=3\P5,P6=0\T=S(2)
470 E1=0\F1=FNN(G0(G1))\F2=FNN(G0(G1))
480 IF G=0 THEN F2=FNN(9-F1)
490 F3=F1+F2\GOSUB 840\PRINT S$\D5=FND(F1)+FND(F2)+FND(F3)
REM ******************************************************
REM *                                                    *
REM *     Based on grade present a problem               *
REM *                                                    *
REM ******************************************************
500 IF S(2)=0 THEN 510 ELSE IF T<=0 THEN 610 ELSE GOTO 530
510 IF P6>S(1) THEN 610
520 PRINT S(1)-P6," problems left ",\T1=TIME(0)\GOTO 540
530 PRINT T," seconds left ",\X=TIME(0)\T1=T
540 PRINT TAB(34),%#3I,F1,X$,TAB(32),"+ ",F2\PRINT TAB(32),"= "
550 P5=P5+1\GOSUB 930
560 IF E=0 THEN P6=P6+1\L=3\GOTO 470
REM ******************************************************
REM *                                                    *
REM *     Print error message if wrong digit given       *
REM *          (no more than 3 errors allowed)           *
REM *                                                    *
REM ******************************************************
570 X=INT(RND(M5)+.5)\X=FNP(M$(X),L,34)\E1=E1+1\L=L+1
580 IF E1<3 THEN X=FNP("Try again ",L,3)\GOTO 550
590 T$=STR$(F3)\PRINT\X=FNP("The correct answer is "+T$,L,3)
600 PAUSE 60\X=TIME(0)\GOTO 470
610 PRINT X$
620 PRINT "  Well,",LEFT$(N$,N1)
630 PRINT " There were ",P5," Problems given"
640 PRINT " Of which you answered ",P6," correctly"
650 PRINT " for a percentage of",%6F1,P6/P5*100," %"
660 IF P5>P6 THEN PRINT " Better luck next time"
670 IF P5=P6 THEN PRINT " Good Work - Congratulations"
680 PAUSE 90\GOTO 1140
REM ******************************************************
REM *                                                    *
REM *    Print a message(M$) at location (H0,V0)         *
REM *                                                    *
REM ******************************************************
690 DEF FNP(U$,H0,V0)
700 K5=6143+H0%64+V0
710 FOR K6=1 TO LEN(U$)\POKE K5+K6,ASC(U$,K6)+128
720 NEXT\RETURN1
730 FNEND
740 DEF FNN(K6)=INT(RND(0)*K6)
REM ******************************************************
REM *               Relative hardness of problem         *
REM ******************************************************
750 DEF FND(X)
760 X5=INT(LOGT(F3+.995)+1.01)
770 X2$=STR$(X,%#3I)\X9=0
780 FOR X6=3 TO 1 STEP -1
790 Y8=ASC(X2$,X6)-48\IF Y8<0 OR Y8>9 THEN 810
800 X9=X9+X5*Y8
810 NEXT
820 RETURN X9
830 FNEND
840 REM ** Divide No. Into Digits **
850 M6=INT(LOGT(F3+.5))+1\F4=F3
870 FOR M8=M6 TO 1 STEP -1
880 F5=F4-INT(F4/10)*10\D(M8)=F5\F4=INT(F4/10)
890 NEXT
920 RETURN
```

Dictionary of Variables

Numeric Variables

A9 — Ascii Value of Inputted character
D5 — Total Difficulty for the Problems
D — Array : Contains each Digit of the answer
Function : difficulty of a problem
E1 — Total no. of errors made this problem
E — Error Flag, 0-Right ,1-Wrong
F1 — 1st addend
F2 — 2nd addend
F3 — Sum of F1+F2
F4 — Temporary Variable used in Dissecting F3 into D
F5 — Current Digit to be stored in D
G0 — Array : Contains highest value to use for addend
G1 — Grade level for problems
G2 — Grade level factor for scoring problems
G6 — % difficulty of problem adjusted to grade
G — Inputted Grade Level
H0 — Dummy Variable — Vertical position for cursor
I9 — Index Variable
I — Index Variable
J — Index Variable
K5 — Base position to poke message
K6 — Index Variable
L — Temporary location
M5 — No. of error messages
M6 — No. of digits in F3
M8 — Index Variable
N1 — Position of Blank after first name
N — Random No. Generator Function
P5 — No. of problems done correctly
P6 — Total no. of problems presented
P7 — Total no. of problems
P8 — Array : Contains Difficulty,Time, and Rt./Wrong Ind.
P — Function to print message at specified location
S5 — The child's score
S6 — Total possible score to be made
S — Array of Indicators:
S(1) — Max. No. of Problems
S(2) — Total time for the problems
T1 — Time used
T — Amt. of time left
V0 — Horizontal position of cursor
X5 — Same as D5
X6 — Index Variable
X9 — Dummy Variable used in Function (FND)
X — Temporary Variable (used for anything)
Y8 — Ascii value of Character in string 'X2$'

Alphanumeric Variables

A$ — Input string for answer
B$ — String containing blanks
L$ — Not used
M$ — Error messages
N$ — Name of child
S$ — CHR$(12)-Form feed character-Clear Screen and Move Home
T$ — Correct answer
U$ — Message to print
X2$ — String containing No. to be printed
X$ — Carriage Return

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Accessing Titles by Keyword

BY JOHN WEBSTER

The other day I wasted a good two hours searching for Ivan Denisovitch. Well, not for him personally, but I was trying to locate the distributor of the film *A Day in the Life of Ivan Denisovitch* by looking through film catalogs and indexes. Although I *knew* it was there, I just couldn't find it. Finally someone pointed out that the proper title is *One Day in the Life of Ivan Denisovitch* and we found it right away.

This got me thinking about how a microcomputer cataloging system might be designed to avoid this sort of accessing problem. Certainly computers can be very useful tools for cataloging and accessing cross-indexed information. Almost anyone could use their own microcomputer to catalog something: records, books, stamps, films, slides, articles and so forth.

If your particular application involves cataloging titled materials such as books, films or magazine articles, there are two preliminary problems you will have to face. The first is your computer's dogged insistence that you enter the title properly every time. For example, most human librarians would know that if you asked for *A Day in the Life of Ivan Denisovitch,* you really meant *One Day in the Life of Ivan Denisovitch*. Not so with a computer (at least not without a little help). Punctuation also contributes to this problem. For example, the character string "BACH Sonatas" is not the same as "BACH: Sonatas". As human beings we readily remember important or key words in a title but are a little fuzzy about articles, prepositions and punctuation. One function of the routine suggested here (see Program Listing) is to make your computer a little more understanding of your human failings.

The second problem to face is what criteria or categories you will use to cross-index these titles. One approach might be to use arbitrarily chosen subject areas such as Education, History, Electronics and so on. Again the problem is in remembering exactly what arbitrary subject areas you've chosen. You may have many, even too many, articles classified under "integrated circuits" while asking your computer what it knows about "TTL" will yield only frustrating silence.

My technique uses all the important or key words in the title for these reference categories. Admittedly this technique is most effective with such things as technical articles or books whose titles tend to be very descriptive of their contents. With slight modification, however, it can be very useful for any type of cataloging.

The technique is presented here as an example program written in North Star Basic. You can use the program as a subroutine or user defined function in any cataloging program you create.

When a title is input to the routine, all punctuation is ignored, removing one major area of ambiguity and inconsistency. Each word in the title is then placed (minus punctuation) in a buffer and compared to a list of common words — articles, prepositions and simple verbs — in the data statements. If the word from the title matches a word in a data statement, it is ignored. Thus, words that occur frequently are ignored. This serves two purposes: first, it removes words from the title that may be fuzzy in the user's mind;

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Sample Run

```
RUN

ENTER TITLE: THE LONG SEARCH
LONG                    1
SEARCH                  2

ACCESS NUMBER:  1 2 0 0 0

ENTER TITLE: BACH: SONATAS
BACH                    3
SONATAS                 4

ACCESS NUMBER:  3 4 0 0 0

ENTER TITLE: BACH SONATAS
BACH                    3
SONATAS                 4

ACCESS NUMBER:  3 4 0 0 0

ENTER TITLE: THE LONG, LONG TRAILER
LONG                    1
LONG                    1
TRAILER                 5

ACCESS NUMBER:  1 1 5 0 0

ENTER TITLE: ONE DAY IN THE LIFE
OF IVAN DENISOVITCH
ONE                     6
DAY                     7
LIFE                    8
IVAN                    9
DENISOVITCH             10

ACCESS NUMBER:  6 7 8 9 10

ENTER TITLE: A DAY IN THE LIFE OF
IVAN DENISOVITCH
DAY                     7
LIFE                    8
IVAN                    9
DENISOVITCH             10

ACCESS NUMBER:  7 8 9 10 0

ENTER TITLE: DAY IN THE LIFE
DAY                     7
LIFE                    8

ACCESS NUMBER:  7 8 0 0 0
```

Program Listing

```
10  REM 'CATALOG' ROUTINE TO ENTER TITLES
20  DIMC$(80),D$(25),L$(25),X$(25),K$(25),N(10)
30  INPUT "ENTER TITLE: ",C$\C$=C$+L$
40 REM RESET WORD COUNTER
50  W=0
60 REM POSITION IN WORD BUFFER
70  M=1
80 REM POSITION IN TITLE $
90  K=1
100 REM END OF WORD?
110  IF C$(K,K)=" " THEN GOSUB 290
120 REM END OF TITLE?
130  IF C$(K,K)=" " THEN IF C$(K+1,K+1)=" " THEN 640 ELSE 260
140 REM DISREGARD PUNCTUATION
150  FOR J=33 TO 47
160 IF C$(K,K)=CHR$(J) THEN EXIT 260
170  NEXT J
180 FOR J=58 TO 64
190  IF C$(K,K)=CHR$(J) THEN EXIT 260
200  NEXT J
210REM SAVE VALID LETTER
220 D$(M,M)=C$(K,K)
230REM ADVANCE BUFFER POINTER
240 M=M+1
250REM ADVANCE POINTER IN TITLE
260 K=K+1
270 GOTO 110
280REM IGNORE ARTICLES, ETC. IN DATA STATEMENTS
290 FOR J=1 TO 59
300  READ X$\X$=X$+L$
310  IF X$=D$ THEN EXIT 410
320  NEXT J
330REM CHECK KEYWORD FILE,RETURN WITH N
340 N=FNA(D$)
350REM PRINT VALID KEYWORD AND IT'S NUMBER
360 !D$,N
370REM BUILD ACCESS NUMBER
380 W=W+1
390 N(W)=N
400REM EMPTY BUFFER
410 D$=L$
420REM RESET BUFFER POINTER
430 M=1
440 RESTORE
450 RETURN
460 DATA "OF","IN","ON","A","FOR","AN","THAT","TO","AND","THE"
470 DATA "THIS","WITH","BY","IS","AS","ARE","LA","LE","DE","IT"
480 DATA "EN","INTO","OR","AM","I","YOU","TOO","AU","ISNT","HIS"
490 DATA "ARENT","NOT","WONT","FROM","ALL","THROUGH","GO","HERS"
500 DATA "OUR","DO","DID","AT","WHO","WHAT","WHEN","WHY","WHERE","THEIRS"
510 DATA "HOW","HE","SHE","WE","THEY","MY","YOUR","US","SO","WILL"," "
520 DEF FNA(B$)
530 OPEN#0,"KEYS"
540 N=0
550 N=N+1
560 IF TYP(0)<>1 THEN 600
570 READ#0,K$,N1
580 IF K$=B$ THEN N=N1 ELSE 550
590 IF K$=B$ THEN 610
600 WRITE#0,B$,N
610 CLOSE#0
620 RETURN N
630 FNEND
640 PRINT\PRINT "ACCESS NUMBER: ",
650 FOR J= 1 TO 5
660 PRINT N(J),
670 N(J)=0
680 NEXT J
690 PRINT\PRINT\PRINT
700 GOTO 30
READY
PSIZE
6 BLOCKS
READY
```

second, it removes words that occur too commonly to be useful as valid key words for reference. The remaining words are then considered to be important enough to be key words and are retained. The user defined function (line 520) in the example program stores these words in a file (KEYS) along with serially assigned numbers. If a word already exists in the file, of course, its existing number is returned. Either way, a number (N) is assigned to each keyword in the title.

If we assume that, say, five keywords will be sufficient to identify any title in our collection, we can identify any title in our collection by a set of five numbers. We will refer to this set as an "access number". If these access numbers are stored along with pointers to other information such as exact title, description, location and other pertinent information, it becomes relatively simple to search these access numbers not only for exact matches or occurrences of a single keyword, but also for patterns of occurrence within the access number. For example, in our Ivan Denisovitch example (see Sample Run) a routine may be written to look for a match of four, or three or two numbers occurring in sequence if a match of five is not found.

If it seems useful in your particular application, such things as author's name and additional subject areas may be linked with the title string. These additional words will be stored as keywords and will produce a more conclusive access number. If you feel the need of subject area classifications, a standard classification system such as the Library of Congress or Dewey Decimal system is recommended. This will also help reduce the problem of forgetting what categories you've used when you want to make a search. Check at your local library for more specific information on these classification systems. A very comprehensive access number might be constructed — for example, by using the first four or five numbers for title keywords, the next for author's last name and the last for a Dewey or L.C. classification.

Finally, although this routine doesn't directly attack the problem of misspelled entries, the use of the title keywords to access a title greatly reduces even this problem. If, for example, you misspell "Denisovitch" the worst that will happen is that the computer won't find an exact match and will return with a listing of all films that include the words "day", "life" and "Ivan" in the proper sequence. □

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Line Renumbering

BY FRANKLYN D. MILLER

Although it's a bit cumbersome, this line renumbering program permits you to go through a program and renumber individual lines one at a time. If you ever have occassion, as I have, to "sneak in a line," this program can be helpful — provided, of course, you had the presence of mind to load it before you started. (It can also be "merged," hence the high line numbers.)

The program was written to make it easy to follow. It will run faster if you use multiple statements per line. This version does not recognize GOSUB, GOTO, THEN and RESUME. Consequently, you must be careful to change the line references by editing if necessary.

To understand this line renumbering program, you must know something about how Level II Basic stores a program in memory. With a 16K or larger memory, the first line starts at address 17129. Consider the following simple program:

```
10  CLS
20  PRINT "THIS IS A LINE RE-
    NUMBERING PROGRAM."
30  PRINT "IT WILL ENABLE
    YOU TO RENUMBER INDI-
    VIDUAL LINES IN A HIGHLY
    FLEXIBLE MANNER."
```

If after entering this program we peek at locations 17129, 17130, 17131 and 17132, we will find the following (in decimal):

```
17129   239
17130    66
17131    10
17132     0
```

Addresses 17129 and 17130 point to the *second* line in the program. Therefore, when Basic executes line 10, it knows the address to go to find line 20. In this program, it doesn't care that it is line 20, since line 10 does not refer to any other lines. That is, to run, all Basic needs to know is where the next line can be found. If the pointer is zero, Basic assumes it has finished the program. Addresses 17131 and 17132 contain the actual first line number — 10,0. Basic stores everything except instructions in decimal and ASCII.

You will note that Basic stores things backwards, the less significant byte comes first (in a two byte number) and the more significant byte is second. The address is, therefore, 42EF(H). It is not necessary to convert to hex to find where the second line (line 20) of the program starts. Merely calculate: $239 + 256 \times 66 = 17135$, the start of line 20.

If we peek at 17135 and 17136 we find:

```
17135    26
17136    67
```

This is the address of the third program line, which calculates to be 17178. Line 20 is stored at 17137 and 17138 as 20,0. Addresses 17178 and 17179 point nowhere, since this is the end of the program. The above pattern, followed throughout the program, establishes the rationale of the renumbering program. Starting with the pointer at 17129, 17130, we look for the next line number. We print the first line number, which is at 17131, 17132, and ask for a change. To change the line number, we go into a subroutine and poke new numbers into 17131 and 17132. Then the program successively follows

Program Listing

```
9998 END
9999 REM THIS EDITION RECOGNIZES AN 'END' STATEMENT AT THE BEGINNING OF A LINE
10000 REM IT DOES NOT LOOK FOR 'GOSUB', 'GOTO', ETC.
10010 CLS : PRINT
10020 N = 17129
10030 L1 = PEEK (N)
10040 L2 = PEEK (N+1)
10050 L3 = PEEK (N+2)
10060 L4 = PEEK (N+3)
10070 L7 = N+2
10080 L8 = N+3
10090 L9 = L3 + 256*L4
10100 PRINT "THE FIRST LINE IS : " L9
10110 GOTO 10140
10120 PRINT "THE NEXT LINE IS : "L9
10130 IF PEEK (L8+1) = 128 PRINT "THIS LINE CONTAINS AN 'END' STATEMENT."
10140 PRINT "TO END, ANSWER THE FOLLOWING QUESTION WITH 'N' ELSE 'Y' OR 'N'."
10150 INPUT "DO YOU WISH TO CHANGE THE LINE NUMBER "; A$
10160 IF LEFT$ (A$,1) = "N" THEN 10290
10170 IF LEFT$ (A$,1) = "Y" THEN GOSUB 10300 ELSE 10180
10180 L1 = L1 + 256*L2
10190 L7 = L1 + 2
10200 L8 = L1 + 3
10210 L2 = L1 + 1
10220 L2 = PEEK (L2)
10225 L3 = L1 + 2
10230 L3 = PEEK (L3)
10240 L4 = L1 + 3
10250 L4 = PEEK (L4)
10260 L1 = PEEK (L1)
10270 L9 = L3 + 256*L4
10280 CLS : GOTO 10120
10290 RETURN
10300 CLS
10310 PRINT
10320 INPUT "ENTER THE NEW LINE NUMBER "; LN
10330 L6 = INT(LN/256)
10340 L5 = LN - L6*256
10350 POKE L7 , L5
10360 POKE L8 , L6
10370 RETURN
```

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through the program to be changed, changing line numbers as required, until the end is reached.

You may find it interesting to experiment with this technique. Enter:

```
29 PRINT "THIS IS A TEST,";
```

then find the location of line 29 and write it down. In the command mode 29 < ENTER> removes line 29. It will be deleted from the program, but you can still find it!

Do this: FOR I =(Address you wrote down) TO (Length of the line deleted+4): PRINT CHR$ (PEEK (I)); : NEXT. You will find that the line is still there with a line number 0, 0.

In anticipation of needing this program you can enter it before your main program, using large line numbers and use it as a subroutine. Or, better yet, enter it and debug it. Line Renumber can test itself. Then put it on tape and whenever you need it, merge it with the program you wish to renumber.

The flexibility is inherent. You may change any line number (provided you do not overlay an existing line, which will be lost). If you have lines

```
30  REM
40  REM
50  REM 'MAKE THIS LINE 35'
```

you can turn line 50 into line 35. When you list, the computer will give

```
30  REM
40  REM 'MAKE THIS LINE 35'
50  REM
```

Thus, you can relocate lines in your program.

If you renumber a line referenced by another line, you will need to go back and edit the old line to give the proper reference line — a minor inconvenience.

Lines 10020 to 10090 find the first line and its number and calculate the address of the second line. L1 and L2 are the second line address; L3, L4, first line number; L7, L8 are not used for the first line; L9 calculates the number of first line.

After the first line, skip lines 10100, 10110. Lines 10120 to 10170 prompt the user and lines 10180 to 10270 calculate the location of the next line. Line 10280 goes back to inform the user of the next line number. Line 10290 returns to the main program when the renumbering subroutine is finished. Lines 10300 to 10370 calculate the new line number and change the old one and return.

Now you know why you shouldn't use unnecessary line numbers if you're limited in memory. Each line takes two bytes for the pointer, two bytes for the line number and one byte to tell Basic where the line ends (a zero). □

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Remember, readers aren't familiar with your program. So explain in detail what the program does and how it does it. Include here the overall structure of your program as well as any special algorithms or routines you've used. Give suggestions for modifying or expanding the program for other applications, other businesses or other situations.

All submissions should be original, typed (not all CAPS), double-spaced and neat. Include your name and address on the first page of the article and enclose a self-addressed, stamped envelope for return of material. Also, please use a fresh ribbon on your printer for program listings and sample runs.

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Amortization Tables

BY DE WITT BROWN

Customized amortization schedules are handy, useful and inexpensive. They can be sold to business people for use with their clients; they provide a demonstration of your system with a personalized memento; they're cheap enough to give away to prospective customers; and, they help justify your income tax deduction of computer equipment.

The Applesoft program is easy to use, but flexible. Of the several options available, most have defaults which may be selected by hitting the return key. Defaults are shown when the user is prompted for input.

Input values are range-checked to verify their credibility. Another check ensures that the amount of the mortgage is actually decreasing.

Output format looks professional. Numbers are right-aligned, leading zeros are not printed and commas are used when a number requires it. Exactly two decimal digits are printed for money amounts, even if the number ends in "0" or "00". The terms of the loan are printed, as well as the final payment. There are even provisions for paper alignment on the printer.

The program's modular design allows you to add the special touches that will impress your clients. Or, the default values could be reset to values you use most often. With a high-speed printer, performance improvements might be worthwhile.

Performance has purposely not been optimized, to avoid overrunning the printer. Even so, you may need to use the speed input parameter to slow the program to the printer rate.

The Compact option, which outputs a compact amortization table, allows output to be printed quicker, since there is less printing to be done.

You should be able to read the Program Listing easily. Code is aligned separately from line numbers. Multiple statements on one line are not run together; a new print line is started for each statement.

Like any program, other features could be included. You may want to add some of the following enhancements:

Sample Runs

MORTGAGE AMORTIZATION TABLE

PRINCIPAL $15000.00 AT 10% FOR 2 YEARS AND 0 MONTHS
REGULAR PAYMENT = $700.00

PAYMENT NO.	CURRENT INTEREST	PRINCIPAL PAYMENT	NEW BALANCE	ACCUMULATED INTEREST
1	125.00	575.00	14,425.00	125.00
2	120.21	579.79	13,845.21	245.21
3	115.37	584.63	13,260.58	360.58
4	110.50	589.50	12,671.08	471.08
5	105.59	594.41	12,076.67	576.67
6	100.63	599.37	11,477.30	677.30
7	95.63	604.37	10,872.93	772.93
8	90.61	609.39	10,263.54	863.54
9	85.53	614.47	9,649.07	949.07
10	80.40	619.60	9,029.47	1,029.47
11	75.25	624.75	8,404.72	1,104.72
12	70.03	629.97	7,774.75	1,174.75
13	64.78	635.22	7,139.53	1,239.53
14	59.50	640.50	6,499.03	1,299.03
15	54.15	645.85	5,853.18	1,353.18
16	48.78	651.22	5,201.96	1,401.96
17	43.34	656.66	4,545.30	1,445.30
18	37.87	662.13	3,883.17	1,483.17
19	32.35	667.65	3,215.52	1,515.52
20	26.79	673.21	2,542.31	1,542.31
21	21.18	678.82	1,863.49	1,563.49
22	15.53	684.47	1,179.02	1,579.02
23	9.82	690.18	488.84	1,588.84
24	4.07	488.84	0.00	1,592.91

LAST PAYMENT = 492.91

MORTGAGE AMORTIZATION TABLE

PRINCIPAL $15000.00 AT 10% FOR 2 YEARS AND 0 MONTHS
REGULAR PAYMENT = $690.00

PAYMENT NO.	CURRENT INTEREST	PRINCIPAL PAYMENT	NEW BALANCE	ACCUMULATED INTEREST
1	125.00	565.00	14,435.00	125.00
2	120.28	569.72	13,865.28	245.28
3	115.53	574.47	13,290.81	360.81
4	110.75	579.25	12,711.56	471.56
5	105.93	584.07	12,127.49	577.49
6	101.06	588.94	11,538.55	678.55
7	96.15	593.85	10,944.70	774.70
8	91.21	598.79	10,345.91	865.91
9	86.21	603.79	9,742.12	952.12
10	81.18	608.82	9,133.30	1,033.30
11	76.11	613.89	8,519.41	1,109.41
12	71.00	619.00	7,900.41	1,180.41
13	65.84	624.16	7,276.25	1,246.25
14	60.64	629.36	6,646.89	1,306.89
15	55.39	634.61	6,012.28	1,362.28
16	50.09	639.91	5,372.37	1,412.37
17	44.76	645.24	4,727.13	1,457.13
18	39.39	650.61	4,076.52	1,496.52
19	33.96	656.04	3,420.48	1,530.48
20	28.50	661.50	2,758.98	1,558.98
21	22.99	667.01	2,091.97	1,581.97
22	17.42	672.58	1,419.39	1,599.39
23	11.82	678.18	741.21	1,611.21
24	6.17	741.21	0.00	1,617.38

LAST PAYMENT = 747.38

- Allow uneven payments. Payments might be low initially, increasing after a period of time.
- Give dates of payments, not just payment numbers. Also, present yearly totals for use in filing income tax.
- Allow the user to put a title on the table; it could give company name, plot number or individual's name.
- Help options could be implemented to further explain input parameters. This might be useful for Speed option.
- With access to a high-speed printer, performance optimization might be justified. □

Program Listing

```
PROGRAM NAME IS AMORTIZATION TABLE MAKER

1000  REM  AMORTIZATION TABLE
1001  REM  MAKER WRITTEN IN
1002  REM  APPLESOFT II
1003  REM  BY DE WITT BROWN
1004  REM
1005  REM  THIS PROGRAM PRINTS
1006  REM   OUT AN AMORTIZATION
1010  REM  TABLE ON AN IDS 225
1020  REM  PRINTER
1030  REM
1100  REM  THE USER MUST ENTER
1105  REM  THE FOLLOWING
1110  REM   INFORMATION--
1120  REM    -PRINCIPAL AMOUNT
1130  REM    -INTEREST RATE
1140  REM    -LENGTH (IN TIME)
1145  REM     OF LOAN
1150  REM    -HOW OFTEN (PER
1155  REM     YEAR) PAYMENTS ARE
1160  REM     TO BE MADE
1170  REM    -AMOUNT OF PAYMENT
1175  REM     (THIS IS OPTIONAL;
1180  REM     THE COMPUTER WILL
1185  REM     FIGURE THIS ON
1190  REM     REQUEST)
1195  REM
1200  REM  DEFINE FUNCTIONS
1210  DEF  FN CENTS(Q) = (Q -  INT (Q)) * 100
:     REM  GET DECIMAL PART OF A NUMBER
1220  DEF  FN D1(Q) =  INT (Q / 10)
:     REM  GET FIRST DECIMAL POSITION OF DECIMAL PART OF NUMBER
1230  DEF  FN D2(Q) = Q - ( INT (Q / 10) * 10)
:     REM  GET SECOND DECIMAL POSITION OF DECIMAL PART OF NUMBER
1240  REM
1300  REM  INTIALIZATION
1305  LL =  PEEK (33)
:     POKE 33,40
1310  HOME
1320  PRINT "MORTGAGE TABLE MAKER"
1330  PRINT
1400  REM  GET PRINCIPAL AMOUNT
1410  PRINT "ENTER PRINCIPAL AMOUNT"
1420  INPUT P
1430  IF P <  = 0 THEN  PRINT "PRINCIPAL MUST BE GREATER THAN 0"
:     GOTO 1400
1440  IF P > 999999.99 THEN  PRINT "MAXIMUM PRINCIPAL IS $999,999.99"
:     GOTO 1400
1450  P% =  FN CENTS(P)
:     REM  P% IS CENTS PART OF PRINCIPAL
1460  P =  INT (P)
:     REM  P IS DOLLAR PART OF PRINCIPAL
1470  PP% = 0
:     REM  CENTS PART OF PRINCIPAL PAYMENT
1480  PP = 0
:     REM  DOLLARS PART OF PRINCIPAL PAYMENT
1500  REM  GET INTEREST AMOUNT
1510  PRINT "ENTER INTEREST RATE AS PERCENT"
1520  INPUT I
1530  IF I <  = 0 THEN  PRINT "INTEREST RATE MUST BE GREATER THAN 0"
:     GOTO 1500
1540  IF I > 30 THEN  PRINT "MAXIMUM INTEREST RATE IS 30%"
1967  IF SP% < 0 THEN  PRINT "MINIMUM SPEED IS 0"
:     GOTO 1960
1970  PRINT "ENTER NULL RETURN WHEN PRINTER READY"
1975  GET KI$
1980  PRINT "ALIGN PRINTER; THEN ENTER NULL RETURN"
1985  PRINT  CHR$ (4);"PR#1"
1986  ONERR  GOTO 9000
1987  PRINT  CHR$ (12)
:     REM  PREPARE PRINTER FOR ALIGNMENT
1990  GET KI$
2000  REM  PRINT THE AMORTIZATION TABLE
2100  REM  PRINT THE HEADINGS
2110  PRINT  TAB( 12 + 2 * S%);"MORTGAGE AMORTIZATION TABLE"
2120  PRINT
2130  PRINT " PRINCIPAL $";P;".";  FN D1(P%);  FN D2(P%);" AT ";I;"% FOR ";YR
      %;" YEARS AND ";MO%;" MONTHS"
2140  PRINT " REGULAR PAYMENT = $";R;".";  FN D1(R%);  FN D2(R%)
2150  PRINT
:     PRINT
2160  PRINT " PAYMENT";  SPC( S% + 2);"CURRENT";  SPC( S% + 1);"PRINCIPAL";  S
      PC( S% + 3);"NEW";  SPC( S% + 3);"ACCUMULATED"
2170  PRINT "   NO.";  SPC( S% + 3);"INTEREST";  SPC( S% + 2);"PAYMENT";  SPC(
       S% + 2);"BALANCE";  SPC( S% + 2);"INTEREST"
3000  REM  UPDATE AND PRINT PAYMENT NUMBER
3010  PN% = PN% + 1
3020  S1% = (PN% < 10) + (PN% < 100) + 3
3030  PRINT  SPC( S1%);PN%;
3100  REM  CALCULATE AND PRINT INTEREST DETAIL
3110  ID =  INT ((P + P% / 100) * I / N% + .5) / 100
3120  ID% =  FN CENTS(ID)
:     REM  GET CENTS PART OF DETAIL INTEREST
3130  ID =  INT (ID)
:     REM  GET DOLLARS PART OF DETAIL INTEREST
3140  S2% = (ID < 10) + (ID < 100) + S% + 4
3150  PRINT  SPC( S2%);ID;".";  FN D1(ID%);  FN D2(ID%);
3160  IF (ID + ID% / 100) >  = (R + R% / 100) THEN  PRINT
:     PRINT "PAYMENT NOT SUFFICIENT TO LOWER BALANCE"
:     GOTO 9000
3200  REM  CALCULATE PRINCIPAL PAYMENT AND PRINT
3210  IF ID% <  = R% THEN PP% = R% - ID%
:     PP = R - ID
3220  IF ID% > R% THEN PP% = 100 + R% - ID%
:     PP = R - ID - 1
3230  IF PN% < TN% THEN 3240
3235  PP% = P%
:     PP = P
3240  IF (PP + PP% / 100) <  = (P + P% / 100) THEN 3250
3245  PP% = P%
:     PP = P
3250  S3% = (PP < 10) + (PP < 100) + 3 + S%
3260  S3% = (PP < 10) + (PP < 100) + 3 + S%
3270  PRINT  SPC( S3%);PP;".";  FN D1(PP%);  FN D2(PP%);
3300  REM  CALCULATE PRINCIPAL BALANCE AND PRINT
3310  IF PP% <  = P% THEN P% = P% - PP%
:     P = P - PP
:     GOTO 3330
3320  P% = 100 + P% - PP%
:     P = P - PP - 1
3330  S4% = S% + 5
:     IF P < 1000 THEN  PRINT  SPC( S4% + (P < 100) + (P < 100));  INT (P);
:     GOTO 3380
3340  S4% = S4% - (P > 10000) - (P > 100000) - 2
:     PRINT  SPC( S4%);  INT (P / 1000);",";
:     P1% = P - ( INT (P / 1000) * 1000)
3350  IF P1% < 100 THEN  PRINT "0";
```

```
:     GOTO 1500
1550  ID% = 0
:     REM  CENTS PART OF DETAIL INTEREST
1560  ID = 0
:     REM  DOLLARS PART OF DETAIL INTEREST
1570  IT% = 0
:     REM  CENTS PART OF TOTAL INTEREST
1580  IT = 0
:     REM  DOLLARS PART OF TOTAL INTEREST
1600  REM  GET LENGTH OF LOAN
1610  PRINT "ENTER TERM IN YEARS,MONTHS"
1630  INPUT YR%,MO%
1650  IF YR% < 0 THEN  PRINT "NEGATIVE YEARS NOT ALLOWED"
:     GOTO 1600
1660  IF YR% > 80 THEN  PRINT "MAXIMUM YEARS IS 80"
:     GOTO 1600
1670  IF MO% < 0 THEN  PRINT "NEGATIVE MONTHS NOT ALLOWED"
:     GOTO 1600
1680  IF MO% > 11 THEN  PRINT "MAXIMUM MONTHS IS 11"
:     GOTO 1600
1690  IF (12 * YR% + MO%) <  = 0 THEN  PRINT "NO TIME SPECIFIED"
:     GOTO 1600
1700  REM   GET NUMBER OF PAYMENTS PER YEAR
1710  PRINT "ENTER NUMBER OF PAYMENTS/YEAR"
1720  PRINT "(FOR 12 PAYMENTS- RETURN ONLY)"
1730  INPUT KI$
:     REM   GET KEYBOARD INPUT
1740  N% = 12
:     IF  LEN (KI$) > 0 THEN N% =  VAL (KI$)
1750  IF N% <  = 0 THEN  PRINT "MINIMUM PAYMENTS/YEAR IS 1"
:     GOTO 1700
1760  IF N% > 365 THEN  PRINT "MAXIMUM PAYMENTS/YEAR IS 365"
:     GOTO 1700
1780  TN% = (12 * YR% + MO%) / 12 * N%
:     REM   TN% IS NUMBER OF TIMES PAYMENTS ARE MADE
1790  PN% = 0
:     REM  NUMBER OF PAYMENT BEING MADE
1800  REM  GET AMOUNT OF PAYMENT
1810  PRINT "ENTER AMOUNT OF PAYMENT"
1820  PRINT "(COMPUTER FIGURES IF NULL RETURN)"
1830  INPUT KI$
1840  IF  LEN (KI$) > 0 THEN R =  VAL (KI$)
:     GOTO 1860
1850  R = ((I / 100) * (P + (P% / 10)) / N%) / (1 - 1 / ((I /
      100) / N% + 1 ) ↑ (TN%))
1855  R =  INT (R * 100 + .5) / 100
1860  R% =  FN CENTS(R)
:     REM  GET CENTS PART OF REGULAR PAYMENT
1870  R =  INT (R)
:     REM  GET DOLLAR PART OF REGULAR PAYMENT
1900  REM  GET IDS PRINTER TURNED ON AND READY
1910  REM  ALSO SET SPEED
1920  PRINT "ENTER 'COMPACT' FOR COMPACT PRINT"
1930  PRINT "ENTER NULL RETURN FOR REGULAR PRINT"
1940  INPUT KI$
1950  S% = 7
:     IF  LEN (KI$) > 0 THEN S% = 0
1960  PRINT "ENTER SPEED (0-255)"
1961  PRINT "ENTER NULL RETURN FOR 255"
1962  INPUT KI$
1965  SP% = 255
:     IF  LEN (KI$) > 0 THEN SP% =  VAL (KI$)
1966  IF SP% > 255 THEN  PRINT "MAXIMUM SPEED IS 255"
:     GOTO 1960
```

```
3360  IF P1% < 10 THEN  PRINT "0";
3370  PRINT P1%;
3380  PRINT "."; FN D1(P%); FN D2(P%);
3400  REM  CALCULATE ACCUMULATED INTEREST AND PRINT
3410  IT% = IT% + ID%
3420  IF IT% >  = 100 THEN IT = IT + 1
:     IT% = IT% - 100
3430  IT = IT + ID
3440  S5% = S% + 4
:     IF IT < 1000 THEN  PRINT  SPC( S5% + (IT < 100) + (IT < 10)); INT (IT
      );
:     GOTO 3490
3450  S5% = S5% - (IT > 10000) - (IT > 100000) - 2
:     PRINT  SPC( S5%); INT (IT / 1000);",";
:     I1% = IT - ( INT (IT / 1000) * 1000)
3460  IF I1% < 100 THEN  PRINT "0";
3470  IF I1% < 10 THEN  PRINT "0";
3480  PRINT I1%;
3490  PRINT "."; FN D1(IT%); FN D2(IT%)
3500  IF ( INT (P) > 0) OR (P% > 0) THEN 3000
3600  REM  PRINT LAST PAYMENT AMOUNT
3610  PP = PP + ID
:     PP% = PP% + ID%
:     IF PP% > 100 THEN PP% = PP% - 100
:     PP = PP + 1
3620  PRINT
3630  PRINT "LAST PAYMENT = ";PP;"."; FN D1(PP%); FN D2(PP%)
3640  PRINT  CHR$ (12)
9000  PRINT
9005  PRINT  CHR$ (4);"PR#0"
9010  POKE 33,LL
9020  SPEED= 255
9999  END
```

Program Roadmap

1000-1199	Remarks	**3000-3099**	Update and print payment number
1200-1299	Define functions used	**3100-3199**	Calculate and print interest detail
1300-1399	Initialization	**3200-3299**	Calculate and print principal payment
1400-1499	Get "Principal" input and check	**3300-3399**	Calculate and print principal balance
1500-1599	Get "Interest" input and check	**3400-3499**	Calculate and print accumulated interest
1600-1699	Get "Term" input and check	**3500-3599**	Loop to 3000 until table printed
1700-1799	Get "Payments/Year" input and check	**3600-3699**	Calculate and print last payment
1800-1899	Get "Payment Amount" input and process it	**9000-9999**	Clean up and end program
1900-1999	Initialize printer		
2000-2999	Print headings for amortization table		

Video Tape Selector

BY ROBERT C. KYLE

Television programs are too varied for ordinary filing methods — that is, for people owning video tape recorders. The 3″x5″ file card system is not feasible if you want to sort the program matter into more than two dimensions.

This video tape file selector program allows three dimensional filing for each program title, not including the cassette location. Capacity could be increased very easily to include the counter number of the program on the cassette. The 100 program length of the file has no significance except with longer files (200 or 300 programs per file), the search time of the computer is increased for each selection you make.

Since the program information is entered into the file program in DATA lines, starting at line 500, it is only necessary to load in any file program you have and then enter the new data starting with line 500. To save making mistakes I only enter two program titles and information per DATA and increment the lines from 500 to 550 by one.

If you are wondering why I didn't create actual computer tape files instead of handling the information as DATA, the reasons are twofold. One is that a file of only 90 programs could be held on one side of a 60 minute tape cassette. The second is that the TRS-80 Level II can only print 248 bytes onto a tape in one PRINT #-1 statement, the rest being "tossed down the tube." Therefore a lot of extra program lines would have been needed to print this much information onto a tape file.

One other important factor (since I had originally written this program as a computer file until I discovered all the shortcomings) is that it took 17 seconds to load each program title and program information onto the tape. Saving the file program as it appears here takes about 30 seconds. My personal file selector is comprised of four files of 100 programs each and they only oc-

Program Listing

```
5 CLS:Print TAB(25)"VIDEO FILE SELECTOR"
10 Print STRING$(32,CHR$(134));STRING$(32,CHR$(134))
15 CLEAR 6000:DIM A$(100,5)
20 Print"TV PROGRAMS ARE FILED BY CASSETTE NUMBER,TITLE,CLASS
   AND TYPES.SELECTION CAN BE MADE BY TITLE,CLASS/TYPE
   COMBINATION, OR TYPE COMBINATION. THERE ARE 100 TV PROGRAMS
   IN THIS FILE STARTING WITH LINE 500."
25 Print"DATA FORMAT IS:CASSETTE NUMBER,PROGRAM TITLE,CLASS,
   TYPE-1,TYPE-2."
30 Print"FOR CLASS--M=MOVIE:S=SERIES:D=DOCUMENTARY:P=SPECIAL:
   V=VARIETY"
40 FOR Q=1 to 100
45   For L=1 to 5
50 READ A$(Q,L)
55 Next L,Q
60 CLS:Print TAB(18)"TYPE";TAB(25)"TO---->";TAB(32)"FORMAT
65 Print TAB(20)"1";TAB(25)"------>";TAB(33)"SEE FILE"
66 Print TAB(20)"2";TAB(25)"------>";TAB(33)"SELECT TITLE"
67 Print TAB(20)"3";TAB(25)"------>";TAB(33)"CLASS/TYPE COMBINATION"
68 Print TAB(20)"4";TAB(25)"------>";TAB(33)"TYPE COMBINATION"
69 Print TAB(20)"5";TAB(25)"------>";TAB(33)"COMBINATION REVERSE"
70 Print TAB(20)"6";TAB(25)"------>";TAB(33)"END"
75 Input X: ON X GOTO 80,200,230,270,290,1000
80 GOSUB 100
85 GOSUB 110
90 Input"WHEN READY -HIT *ENTER*";X
95 GOTO 60
100 CLS:Print"C#";TAB(5)"TITLE";TAB(27)"CLASS";TAB(35)"TYPE-1";
    TAB(48)"TYPE-2"
105 RETURN
110 FOR Q =1 to 100
115 Print A$(Q,1);TAB(5)A$(Q,2);TAB(29)A$(Q,3);TAB(35)A$(Q,4);
    TAB(48)A$(Q,5)
120 FOR X= 1 to 100: Next X
125 Next Q: RETURN
140 GOSUB 100
145 Print A$(Q,1);TAB(5)A$(Q,2);TAB(29)A$(Q,3);TAB(35)A$(Q,4)
    TAB(48)A$(Q,5)
150 Input"WHEN READY -HIT *ENTER*";X
155 RETURN
200 Print"WHAT TITLE DO YOU WANT?";Input Y$
205 FOR Q = 1 to 100
210 IF Y$=A$(Q,2) GOSUB 140
215 Next Q
220 Print"TITLE NOT IN THIS FILE":GOTO 60
230 I=3:J=4:K=5
235 Print:Input"WHAT IS THE CLASS/TYPE COMBINATION";Y$,Y1$
240 For Q= 1 to 100
245  IF Y$=A$(Q,I) and Y1$=A$(Q,J) THEN GOSUB 140
250  IF Y$=A$(Q,I) AND Y1$=A$(Q,K) THEN GOSUB 140
255 Next Q:GOTO 60
270 Print:Input"WHAT IS THE TYPE COMBINATION";Y$,Y1$
275 FOR Q= 1 to 100
280  IF Y$=A$(Q,J) AND Y1$=A$(Q,K) GOSUB 140
285 Next Q: GOTO 60
290 T$=Y$:V$=Y1$:Y$=V$:Y1$=T$:GOTO 275

500 DATA
505 DATA
 .
 .
 .
1000 END
```

Sample Run

```
                    VIDEO FILE SELECTOR
*******************************************
TV PROGRAMS ARE FILED BY CASSETTE NUMBER,TITLE,CLASS AND TYPES.
SELECTION CAN BE MADE BY TITLE, CLASS/TYPE COMBINATION OR TYPE
COMBINATION. THERE ARE 100 TV PROGRAMS IN THIS FILE STARTING
WITH LINE 500.
DATA FORMAT IS: CASSETTE NUMBER, PROGRAM TITLE,CLASS,TYPE-1,TYPE-2.
FOR CLASS--M=MOVIE:S=SERIES:D=DOCUMENTARY:P=SPECIAL:V=VARIETY

      TYPE    TO---->    FORMAT
       1      ------>    SEE FILE
       2      ------>    SELECT TITLE
       3      ------>    CLASS/TYPE COMBINATION
       4      ------>    TYPE COMBINATION
       5      ------>    COMBINATION REVERSE
       6      ------>    END

? 2
WHAT TITLE DO YOU WANT?
?NIGHT STALKER

C# TITLE                    CLASS      TYPE-1       TYPE-2

12  NIGHT STALKER             M         HORROR       MYSTERY

WHEN READY -HIT *ENTER*

      TYPE  TO---->     FORMAT
       1    ------>    SEE FILE
       2    ------>    SELECT TITLE
       3    ------>    CLASS/TYPE COMBINATION
       4    ------>    TYPE COMBINATION
       5    ------>    COMBINATION REVERSE
       6    ------>    END

?6
```

cupy two minutes of cassette tape.

The program is explained by the introductory statements. How you classify TV programs is completely up to you. What I think of as a comedy you might classify as a drama. Terms I used for typing were comedy, drama, horror, mystery, adventure, history, black, humanity, play, novel, animal, insect, reptile, Nat.Geog. (National Geographic) and W.W.O.A. (Wild World Of Animals). Of course, your list will be longer or shorter as you see fit. You don't have to remember what terms you used for typing your programs.

Let's say you wanted to search a file for "comedy, play" under the Type Combination category. Nothing appears on the screen except the format menu again indicating that such a program is not to be found in the file. All you do then is type a "5" and the screen lights up with our title and cassette number because you "filed" the program as a "play, comedy." That is why I included the Combination Reverse. I have found the most powerful selector in "3" — the Class/Type category. You can enter "M" (movie), "comedy" and the computer will search both Type-1 and Type-2 for a movie "comedy".

The title selection was included in the program because I have a few video friends who are always calling me up and asking if I have "such-and-such" program on tape. How can I remember what I have on tape with 400 different programs in my files? I found out that I have programs that I didn't know I had.

Of course you can always see the file. Line 120 allows about a fifth of a second to scan the title (which is all you need to see). Without that little time delay the printout is so fast that everything rushes past . . . well you know how fast some of the printouts can be.

Debugging is easy. Ninety-nine percent of your errors are going to come from entering your data. A missed comma can make your file printout look like something the cat wouldn't drag in. Noting the program where the problem occurs will make it easy to find the right data line to correct, which is another reason for limiting each file to 100 programs. With only two program titles and information on each data line I can get a quick idea of the data line in error just by making a hasty count down the file printout. Of course that is my personal preference. The file program can be modified quite easily to accommodate just about anyone.

A little advice: Due to limited line space I limited my titles to 30 characters, my Type-1 and Type-2 terms to 10 characters and my cassette numbers to 3 characters. This method leaves room between columns and lets you fill up the screen all the way across. □

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CIRCLE 30

Save Those Bytes

Storing Dates on Disk

BY CHARLES Z. TZINBERG

One method of storing dates on your disk uses a string variable eight bytes long in the form "MO/DA/YR". The date can be read or stored without any modification. However, this method wastes precious disk space and is easily improved upon by using a subroutine:

```
100 DATE$ = LEFT$(DATE$,2) + MID$(DATE$,4,2) + RIGHT$(DATE$,2) : RETURN
```

This routine removes the slashes and stores DATE$ using only six bytes (MODAYR). Upon retrieval, use:

```
200 DATE$ = LEFT$(DATE$,2) + "/" + MID$(DATE$,3,2) + "/" + RIGHT$(DATE$,2) : RETURN
```

All this work, however, saves only two bytes, and is hardly worth the effort.

Program Listing 1, consisting of two subroutines, takes the date (DATE$) in the form "MO/DA/YR" and returns an integer representation of it (DATE%). Now you can store a date using only two bytes! To use the program, when you have a date in the proper form (MO/DA/YR), GOSUB 100.

An added benefit of the subroutine, found in lines 100 to 110, checks to make sure the format is correct; if any part of the date is in error, a 0 is returned as DATE%. I use the subroutine immediately after inputting dates from the keyboard. If DATE% = 0, I ask for input again. This simple method avoids mistakes.

When retrieving a date from disk, first convert it to an integer, then GOSUB 200; the date is back to its original form (MO/DA/YR). If an error occurs, there is no break in the program, but a string of eight spaces is returned. If you prefer, substitute "00/00/00" for the eight spaces in line 202.

For actual inclusion in my programs I use the subroutines in Program Listing 2. The only difference is that I have removed the REMark statements and used multiple lines for maximum compactness and speed. □

Listing 1

```
10 REM
97 REM SUBROUTINE TO TAKE DATE$ (MO/DA/YR)
98 REM  AND CONVERT IT TO INTEGER DATE%
99 REM  NOTE: 0 RETURNED ON ERROR
100 ON ERROR GOTO 102
101 GOTO 104
102 DATE% = 0
103 GOTO 250
104 IF LEN(DATE$) <> 8 THEN 102
105 IF VAL(LEFT$(DATE$,2)) < 1 THEN 102
106 IF VAL(LEFT$(DATE$,2)) > 12 THEN 102
107 IF VAL(MID$(DATE$,4,2)) < 1 THEN 102
108 IF VAL(MID$(DATE$,4,2)) >31 THEN 102
109 IF MID$(DATE$,3,1) <> "/" THEN 102
110 IF MID$(DATE$,6,1) <> "/" THEN 102
111 DATE$ = LEFT$(DATE$,2) + MID$(DATE$,4,2) + RIGHT$(
    DATE$,2)
115 TEMP$ = MID$(DATE$,3,2) + RIGHT$(DATE$,2) + MID$(
    DATE$,2,1)
116 DATE% = VAL(TEMP$)
117 IF VAL(LEFT$(DATE$,2)) > 9 THEN DATE% = DATE% * -1
118 GOTO 250
196 REM
197 REM SUBROUTINE TO TAKE DATE% (DAYRM)
198 REM  AND CONVERT IT TO DATE$ (MO/DA/YR)
199 REM  NOTE: EIGHT SPACES (        ) RETURNED IF
    DATE% = 0
200 ON ERROR GOTO 202
201 IF DATE% <> 0 THEN 204
202 DATE$ = "        "
203 GOTO 250
204 TEMP$ = STR$ (DATE%)
205 MID$(TEMP$,1,1) = " "
206 IF LEN(TEMP$) = 5 THEN TEMP$ = " " + TEMP$
207 DATE$ = MID$(TEMP$,2,2) + "/" + MID$(TEMP$,4,2)
208 TEMP% = VAL(RIGHT$(TEMP$,1))
209 IF DATE% < 0 THEN TEMP% = TEMP% + 10
210 DATE$ = STR$(TEMP%) + "/" + DATE$
211 IF LEN(DATE$) = 9 THEN DATE$ = MID$(DATE$,2,8)
212 IF MID$(DATE$,4,1) = " " THEN MID$(DATE$,4,1) = "0"
213 IF LEFT$(DATE$,1) = " " THEN MID$(DATE$,1,1) = "0"
250 ON ERROR GOTO 0
251 RETURN
```

Listing 2

```
10 REM
100 ONERRORGOTO102:GOTO104
102 DT%=0:GOTO250
104 IFLEN(DT$)<>8ORVAL(LEFT$(DT$,2))<10RVAL(LEFT$(DT$,2))>12ORVAL(MID$(DT$,4,2))<10RVAL(MID$
    (DT$,4,2))>31ORMID$(DT$,3,1)<>"/"ORMID$(DT$,6,1)<>"/"THEN102ELSEDT$=LEFT$(DT$,2)+MID$(DT$,
    4,2)+RIGHT$(DT$,2):D$=MID$(DT$,3,2)+RIGHT$(DT$,2)+MID$(DT$,2,1):DT%=VAL(D$)
113 IFVAL(LEFT$(DT$,2))>9THENDT%=DT%*-1:GOTO250ELSE250
200 ONERRORGOTO202:IFDT%<>0THEN204
202 DT$="        ":GOTO250
204 D$=STR$(DT%):MID$(D$,1,1)=" ":IFLEN(D$)=5THEND$=" "+D$
207 DT$=MID$(D$,2,2)+"/"+MID$(D$,4,2):D%=VAL(RIGHT$(D$,1)):IFDT%<0THEND%=D%+10
210 DT$=STR$(D%)+"/"+DT$:IFLEN(DT$)=9THENDT$=MID$(DT$,2,8)
212 IFMID$(DT$,4,1)=" "THENMID$(DT$,4,1)="0"
213 IFLEFT$(DT$,1)=" "THENMID$(DT$,1,1)="0"
250 ONERRORGOTO0:RETURN
```

HARRY SHERSHOW — Dept. Editor
MORRIS MILLER — Chess Annotater

Modular Game System and BORIS/SARGON 2.5

A new product review
BY MICHAEL HAM

The "MODULAR GAME SYSTEM" from Applied Concepts represents a quantum leap forward in games-playing computers. It is the first dedicated general-purpose game computer. Currently being marketed with the BORIS/SARGON 2.5 chess module, this stand-alone device (no TV interfacing) will soon be playing blackjack, checkers, backgammon and many other games as new modules become available. This review focuses on the design of the Game System rather than on the chess-playing skills of the program.

The Modular Game System (MGS-1) houses a 2 Mhz 6502 microprocessor, a 10 VDC power supply (from a 110 VAC converter), a general-purpose unlabeled keypad, a small speaker for audio response, a fluorescent digital display, and a socket for the module. All of these reside in a draw that slides into the case. Surface of the draw is a chessboard, labeled with standard algebraic chess notation. The draw assembly has a rechargeable battery (for domestic markets only), which, when used, makes the MGS-1 completely portable. The device is provided with an AC adapter. When the battery is in place it is continuously being recharged while the unit operates through the adapter. A fully charged battery will provide about 9-12 hours of play. If any of these components go bad the unit can be returned to the factory for replacement or repair of the defective parts under the terms outlined by the company in its warranty statement.

A few weaknesses

Generally speaking, the MGS-1 is well designed, but there are some weaknesses. The keypad has covered keys, and these require rather firm pressure to operate. The hum from the AC adapter can be heard across the room; a quieter model would be preferable. (Jim Morgan, VP of Allied Concepts, says this hum was caused by a faulty transformer. That part has been replaced with a better unit from a different company and the hum problem has now been eliminated.) The beep of the audio response is also too loud for some situations — for example, in a chess tournament or in a quiet room. (They have learned from user feedback, says Jim, that people want a loud beep to signal their turn to move. In the relaxed atmosphere of a quiet chess room, players sometimes tend to doze off for a minute or so.) Planned later models will have an option of sound or no sound. It is still a nice touch to have a beep that announces BORIS/SARGON's move and a burp that signals an attempt to enter an illegal move.

The blue fluorescent display is tilted so the player has a good view. This is significantly better than CHESS CHALLENGER 7's display, which, although it has larger numerals, is not tilted forcing the player to crane forward to discern whether the display is showing an "E" or an "F". Characters in the MGS-1 display are all clearly visible. Also, the chessboard itself is nonreflective, again an improvement over CHALLENGER 7's board. In some lighting situations, CC7 reflects so much glare that one cannot tell which squares the pieces are on.

BORIS/SARGON 2.5 is supplied with a chess set, a user's manual, and a plastic overlay with which to label the keypad. With this module, MGS-1 becomes the strongest chess-playing computer on the market today. BORIS/SARGON 2.5 uses the same algorithm as the SARGON II cassette marketed by Hayden. However, BORIS/SARGON 2.5 runs on the 2 Mhz 6502, while the cassette runs on the 1 Mhz 6502 in the Apple computer. Besides, the MGS-1, unlike the bulky Apple is highly portable, even without the battery.

The chess set is standard Staunton design. It is made of plastic and is somewhat fragile. The pips on the pawns tend to break off, but are easily glued back on again with epoxy. Really, a minor point. The set is magnetized and grips the board securely. In fact, you can turn the board on its side without dislodging a piece. This is an especially helpful feature because portable sets are often played in situations where the board is likely to be jostled.

Functions provided for BORIS/SARGON 2.5 reflect the great amount of user experience that has by now been accumulated for sophisticated chess-playing computers. It has a "halt/hint" key that enables you to force the program to quit its analysis and move. A "best" key elicits BORIS/SARGON's best response instead of a randomly selected "good" response. A "restore" key takes back the unit's most recent move as well as your own move that preceded it. If that key is pressed repeatedly, it will continue to take back moves, up to a limit of three moves. The "restore " key does not, however, clear the display which continues to show the last move BORIS/SARGON made before the "restore" key was pressed, even though that move has been retracted by the "restore" action. BORIS/SARGON 2.5 uses literally every bit of its 8K ROM and 2K RAM, so it can't write memory on such routines as board clearance. (BORIS 3, now in the planning stage, will have the relatively ample storage capacity of 12K ROM and 3K RAM for its use. Board clearance, then, may be a simple matter.)

Chatter, chatter, chatter

BORIS/SARGON 2.5 also provides comments. Ah, yes, those comments! They crawl across the display at a snail's pace (for example, the opening message, "SARGON awaits your move," takes 12 seconds — try spending 12 seconds reading that phrase.) Furthermore, the comments appear

right after the beep announcing BORIS/SARGON 2.5's move. That is precisely the moment when your primary interest is concentrated on waiting for BORIS/SARGON 2.5's response. There is no way to turn off the comments because the keypad has been inactivated while the messages are being displayed. So "halt" doesn't work. The user quickly becomes familiar with all the messages and in short order recognizes the entire message from seeing just the first word. Meanwhile, he must sit there, anyway, waiting until the entire phrase has limped by. The messages, though, are delightful experiences to anyone meeting BORIS/SARGON 2.5 for the first time.

It must be admitted that the messages are game-related, and often seem uncannily appropriate. Nevertheless, the user should be able to bypass the messages if he is not in the mood for them especially if he happens to be losing. For example, the question "Comments?" could appear when the unit is turned on. If the player then responds by pressing a "No" key (the nonfunctional "9" key could become a Yes/No key), the program could skip the chatter and concentrate on play.

The display coding is quite clear. One minor complaint is that the crossbar on the "G" is lighted, so it has the same appearance as the "6". Thus "G6" is displayed as "66". Perhaps later editions of BORIS/SARGON 2.5 will leave the middle crossbar dark on the G to avoid this problem.

The rank display shows both rank number (while the key is depressed) and contents of the rank (when the key is released), using clear and clever symbols to represent the pieces. A cursor key lets the user step across the rank being displayed and enter, delete, or alter the piece in each square in order to set up a specific position.

Unfortunately, no symbol is provided for an empty square, so if a rank contains a single piece on one of the middle squares, it is impossible to determine which square without stepping the cursor (displayed as an underscore) across the rank, counting as you go. The empty squares definitely need to be marked by some symbol — a hyphen, for example. (Jim Morgan explains that there is now a "gold" dot on the window of current models which rates board positions 1 through 8.)

The cursor's position is also difficult to determine, and the occasional user will have trouble remembering whether the underscore reveals where the cursor *is* or where it *was*. This problem could possibly be avoided through a different mode of display. For example, the symbol in the square that would be affected by an entry or alteration could blink while the other squares remained steady. Stepping the cursor across the rank would then cause each square in turn to be the blinking square, and thus the user could always see clearly which square would be affected by an entry, deletion, or alteration. ("Not enough storage space in memory to do that yet," says Jim.)

The unit in action

BORIS/SARGON 2.5's chess-playing ability is good, with levels varying from from 0 (weakest) through 6 (strongest). The default level is 1. The 0 level provides an immediate response to each move, relatively weak play, and no hints. Other levels take progressively longer response time to each move (once the game has progressed beyond BORIS/SARGON 2.5's opening book). The "halt" key does enable the player to force an immediate response from BORIS/SARGON at any time. As the program computes a move, a blinking display (by pressing "rank") shows its contemplative process. This can be misleading, because the actual move BORIS/SARGON finally selects may not appear until the final blink. One might easily become hypnotized by an earlier move on which the unit spent most of its time. The "piece mover" might then make that move on the board instead of the one BORIS/SARGON actually selected. This could lead to incorrect board positions and subsequent confusion. You can avoid this problem by pressing the "time" key after you enter your own move. The display will then show the time BORIS/SARGON is taking in its response instead of the move being considered. When the program makes its move, the display will automatically switch back to display the move that was just selected.

A more serious problem leading to discrepancies between the physical chessboard and BORIS/SARGON's internal representation of it results from pieces being displaced or changing color. For example, in one game a white pawn in the middle of a cluster of white pawns suddenly changed color and ran amuck, slaughtering its comrades. Jim Morgan said that this kind of problem is not due to a program bug, but probably results from fluctuations in line voltage, which cause the hardware to drop bits here and there. He pointed out that the optional battery pack helps prevent such problems, since the battery is always in the circuit and thus tends to even out any variations in the line voltage. Jim says that Allied Concepts has also increased the margins for incoming voltage so that even if the voltage dropped to 99 VAC, there would be no current fluctuation.

Morgan also commented on endgame play, normally strong for BORIS/SARGON. Some users have used the rank display and cursor to set up endings like rook and king against king, and then have watched BORIS/SARGON move aimlessly in circles instead of closing in for the kill. The problem, said Jim, stems from the program, which doesn't switch into endgame routines until after move 30. A player can use the B/W key (at level 0) to quickly force the move counter up to 30, and then set up the endgame position (and reset the level), after which the unit will play more purposefully. (The suggestion earlier, that an opening dialogue be used to determine whether a player wanted comments, could also include a question to see if the player wanted the endgame routines activated from the start.)

Some faults in the manual

The user's manual has some omissions; for example, it points out that after a game has ended, you can start the next game simply by using the "enter" key (and waiting 12 seconds for the opening message to trudge by). But it fails to note that this will reset all parameters to their default values: level is reset to 1, and the "best" option is turned off. It would be better if BORIS/SARGON left these alone until reset by the player or until power is turned off.

Documentation is unfortunately usually written by people very familiar with the program. These programmers tend to take things for granted that are far from obvious to the new user. Jim Mor-

gan says questions, comments, and suggestions regarding the user's manual are welcome. You can write to him at Applied Concepts; 207 North Kirby St.; Garland, TX 75042.

New modules for the MGS-1 will soon be forthcoming. A checkers module is now ready. (Presumably this will be supplied with a board overlay containing the standard checkers notation.) The "Las Vegas" blackjack module, also now available, will have an opening dialogue to enable the user to specify the number of players as well as the number of decks to be used. And, of course, the BORIS 3 chess module is now under development. One hopes that BORIS 3 will not only provide a higher level of play, but also will offer more amenities along the lines suggested above.

The best in the world?

In general, the Modular Game System stands in a class by itself. It is, by far, the most promising development in the computer-games field. The advent of a general-purpose games-playing dedicated computer, like MGS-1, will change the whole nature of the business! In my opinion, a dedicated games player will find no better buy than the MGS, and the future possibilities are mind-boggling: BACKGAMMON, GO-MOKU, CHECKERS, OTHELLO and other board games, including games now being developed especially for this system. As more experience is gained in developing these game modules, one would expect that the minor oversights evident in the design of the BORIS/SARGON 2.5 chess module will be eliminated, and we all can move happily into the next generation of games computers.

"Easy Money" Offer

Carnegie-Mellon University has established a $100,000 prize for the first computer program to become World Chess Champion. The university has also announced the beginning of an annual computer-versus-human competition as an arena for this purpose. The award, called the Fredkin Prize, has been established by the Fredkin Foundation of Cambridge, MA.

The Fredkin Foundation was founded 10 years ago by Edward Fredkin, professor of Electrical Engineering at MIT. Main objective of the foundation is to finance independent research in computer science, says Prof. Fredkin. He hopes that his newly announced offer will inspire an increased surge in artificial intelligence research. He feels that the $100,000 prize money will produce an unbeatable computer chess program within 10 years, just as prize money, at the turn of the century, spurred the successful demonstration of man-powered flight on an English airfield.

Competition will be monitored by the International Joint Conference on Artificial Intelligence (IJCAI) of Menlo Park, CA. A non-profit technical organization, the IJCAI is devoted to advancing the science of computer program construction with the end result of achieving intelligent action by computers. Carnegie-Mellon will be trustee for the prize until it is awarded.

A committee has already been formed whose first and primary task will be to establish precise rules for the competition. Heading this rules committee is Dr. Hans Berliner, of Carnegie-Mellon's Computer Science Department. At one time, he held the title of World Correspondence Chess Champion. He is also author of the world's strongest backgammon program which last year defeated the World Backgammon Champion in a demonstration tournament at Monte Carlo.

"We want to insure that this will be an honest encounter," says Dr. Berliner. "Any human competitor playing against a computer will have the right to place a qualified observer at any point. This will guarantee to him that the computer is generating actual moves and that there is no group of consulting chess experts at the end of the wire."

The chance that a computer might become World Chess Champion in the next five years appears remote, Berliner believes. "It will take more than five years and probably much longer," he says. "By 1990, I think there could be a 50-50 chance that it might happen. From that point the odds will gradually get better. Twenty years from now it is almost a certainty."

Winning such a championship is a long process that takes four years in human tournaments. The computer likewise will have to work its way up the ladder in tournament play. "Reaching the first rung of that ladder is three or four years away," Berliner continues. "However, I think a computer will be playing in a U.S. Invitational Championship within the next five years."

In the interim, a set of incentive prizes will be offered each year for computer-versus-human competition. "Two human players at a designated skill level will be selected randomly from among chess players at that same level," Berliner explains. "These players will engage the best and second-best computer programs as determined by that year's competition. Every contest will consist of a pair of games with the best score in the two games (human or machine) receiving the prize for that year. In case of tie, the prize money will be split evenly."

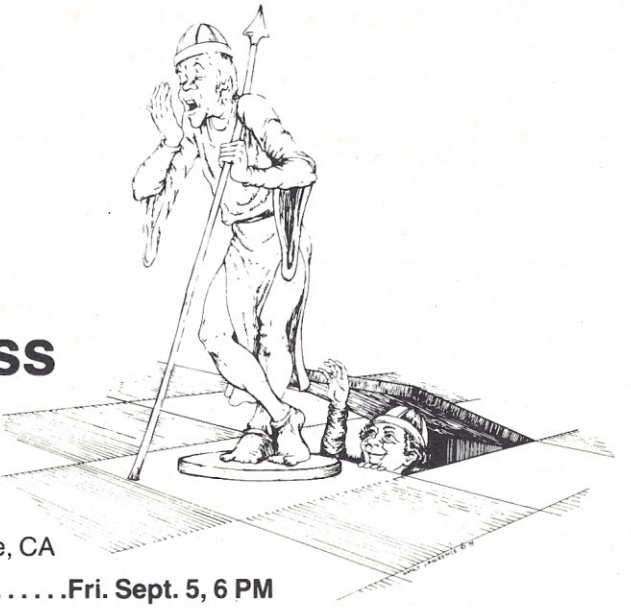
The skill level of the human players will be increased every year as will the amount of the prize. The first competition has already been scheduled for this November at CMU and the prizes will be $1,500 and $1,000 respectively.

Major progress in computer chess began in 1965. Richard Greenblatt of MIT developed a program then, which became the first ever to win a game against a tournament level player. Within a year, Greenblatt had improved the program to a point where it achieved a Class C rating in human competition. The best program available today is Chess 4.9 at Northwestern University which plays at low expert levels (around 2000).

Personal Computing

Presents:

First United States Microcomputer- Chess Championship



September 5-6-7, 1980 (Fri., Sat., Sun.)

Location: Le Baron Hotel, 1350 N. First St., San Jose, CA

Schedule of Rounds:
Round One .....Fri. Sept. 5, 6 PM
Round Two .....Sat. Sept. 6, 9 AM
Round Three .....Sat. Sept. 6, 2 PM
Round Four .....Sun. Sept. 7, 9 AM

Tournament Director: Bryce Perry, Palo Alto, CA
Tournament Coordinator: George Koltanowski, San Francisco, CA 94109

Participating sponsors: Personal Computing, Applied Concepts, Mychess Programming Team, Motorola.

SPECIAL EVENTS

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Free admission
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Simultaneous exhibitions by International and National Chess Masters, all day Sat. Sept. 6 and all day Sun. Sept. 7
Return the following reservation form plus $2 (check or MO). This will entitle you to play in the exhibition. All who win or draw will receive a prize.
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Name _____

Street Address _____

City _____ State _____ Zip _____

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Please reserve a board in the simultaneous exhibition.

Expect to arrive on Saturday ____ Sunday ____ at ____

(IMPORTANT REMINDER: Bring board and men!!!!)

BORIS jousts in England

"In a recent letter to your column," writes D.G. Champernowne (Professor Emeritus, Trinity College) of 25 Worts Causeway, Cambridge, CB1 4RJ, England, "I suggested sending you an account of a game against our 'Boris Diplomat' with a commentary by a more experienced player.

"During a holiday in Wales, when the weather was atrocious, I combined playing a protracted game against Boris with reading a novel and I enclose an account of it. This commentary was written by myself with considerable help from a much better player who wishes to remain anonymous. He had also commented on an earlier game which I had won against Boris, whereas the enclosed game was a draw. In his letter about the enclosed game he says:

" 'In general, I think Boris plays much better than in the other game you showed me, and some moves are very good; e.g., the boxing-in of White's Rook by moves 38 and 39. But some of the moves are not only weak or bad but totally pointless — e.g., the King's moves from 15 onwards and (as you say) 19 and some others. He plays the endgame feebly; once he had immobilized the White Rook at move 39 he should have won.'

"I hope you will find this of some interest. I think it is the best game that Boris has played against me so far. It is a pity he needs so long to think if he is to give one a good game: it may be a good idea always to stop and adjudicate the game after about 40 moves."

("Boris Diplomat" is an earlier, weaker version of BORIS/SARGON 2.5. Perhaps Mr. Champernowne is fortunate that he did not take the newer model along on his vacation. Otherwise, if he had been trounced by the "little black box" and if he is an emotional chess player, as most chess players are, then his relaxing sojourn to Wales might have been less than a tranquil experience. Ed.)

D.G.C. White	BORIS Black (7 minutes per move)
1. P-K4	P-K4
2. N-KB3	N-QB3

(Boris' first 2 moves were imposed.)

3. B-N5	P-B3
4. 0-0	P-Q4

(Boris' reply is more adventurous than 4. . . .KN-K2 which Steinitz played against Tarrasch (Neuremburg 1896).)

5 R-K1	PxP
6. RxP	B-KB4
7. R-K2	P-QR3
8. NxP ?	

(Threatening 9. NxN ch. K-Q2 10. NxQ, but the move is unsound.)

8.	B-K5 ?

(Missing the simple reply 8. . .PxN which wins a piece: for example, 8. . .PxN 9. RxPch. N-K2 10. BxN ch. PxB 11. Q-R5ch. P-B3 leaves White in an inferior position.)

9. RxB ?	

(White in turn misses the chance of gaining a piece by 9. NxN for if 9. . . .PxN 10. BxP ch. K-B2 11. RxB etc. or if 9. . . .Q-Q4, 10. P-QB4 etc.)

9.	PxN
10. BxN ch.	PxB
11. P-Q4	B-Q3
12. N-QB3	

(Stronger would be 12. PxP but the threat by Boris of QxQ Mt. makes the play after this difficult.)

12.	N-KB3
13. B-N5	Q-N1
14. BxN	PxB
15. R-N1	K-K2
16. P-QR3	

(White aims to cramp the Bishop.)

16.	P-KB4
17. R-K3	K-K3 ?

(Boris has exposed his King prematurely. White could initiate an attack by 18. Q-R5 and later move his Rook on K3 to KN3. However the game continued.)

18. P-B4	P-K5
19. P-KN3	P-R3

(Boris' move wastes a tempo)

20. P-QN4	

(Threatening to capture the QBP after 21. P-Q5 ch., but)

20.	K-B3

(saved the QBP.)

21. P-Q5	Q-N2
22. K-B2	K-N3

(Anticipating White's next move.)

23. Q-Q4	PxP
24. QxP	QxQ

(Boris boldly exchanges Queens.)

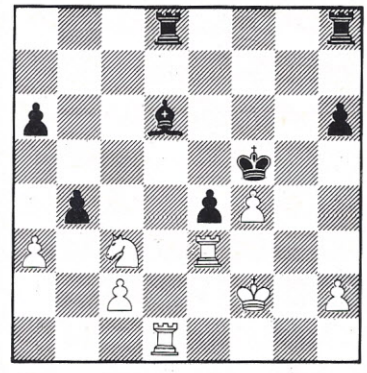
25. NxQ	P-B3
26. N-B3	P-B4

(Boris threatens to pin the Rook if White captures the QBP)

27. R-Q1	QR-Q1
28. P-N4	QBPxP
29. PxP ch. ?	KxP

(White has needlessly weakened his position. He should have played 29. PxNP and must now play 30. PxNP to avoid losing his Knight or the exchange by having the Rook pinned by the Bishop. Even so, very careful play will be required to avoid a breakthrough by Black.)

30. NxP ?



Position after 29. . . . KxP

(White's further blunder leaves the Rook on Q1 unguarded and Black can win the Knight or the exchange by pinning the other Rook.)

30.	BxP ?

(Black however misses the opportunity of 30. . . .B-B4 31. NxB RxR or if 31. RxR BxR ch. 32. KxB RxR giving good chances of win for Black.)

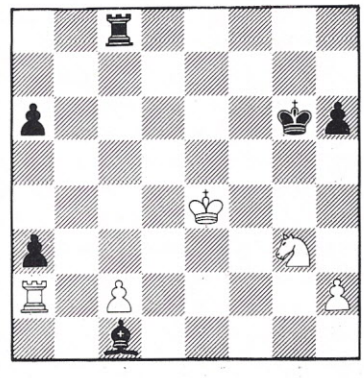
31. R(K3)-K1 ?	

(White manages again to offer Black good chances of a win. A better continuation would have been 31. R(K3)-Q3 RxR 32. PxR P-N6 33. R-QN1 R-QN1 etc. but play for White could still be tricky.)

31.	PxP ?

(Black again misses the chance of gaining a piece, namely by 31. . .RxR 32. RxR KxN and the oversight leaves White still in the game.)

32. R-QR1	R-QB1
33. R-K2	R-B5
34. K-B3	R-QR5
35. R-R2	R-QB1
36. N-N3 ch.	K-N3
37. R-K4	RxR
38. KxR	B-B8 !



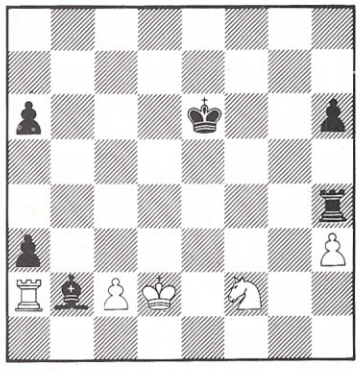
Position after 38. . . . B-B8

(A triumph of Matter over Mind. Boris' excellent move threatens to imprison the Rook.)

39. K-Q3	B-N7

(Finally boxing in White's Rook. Against a stronger player White might well now resign, but Boris weakest feature is ineptitude in the endgame.

40. N-K4	R-Q1 ch.
41. K-K2	R-Q5
42. K-K3	K-B4
43. N-B2	R-QB5
44. K-Q2	R-KR5
45. P-R3	K-K3 ?



Position after 45. . . . K-K3

(Boris has not pressed home his advantage. His King is now very badly placed at K3. The rest of the game is tedious because of Boris' ineptitude in the end-game. However White only manages to draw.)

46. N-Q1	

(The chivalrous Knight hopes to free the Rook.)

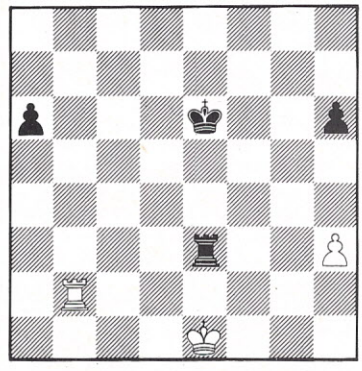
46.	R-Q5 ch.
47. K-K1	B-B8
48. P-B3	R-Q6
49. R-R1	

(White now is playing for a draw.)

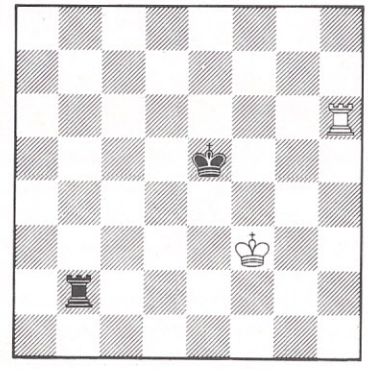
49.	B-N7
50. NxB	PxN
51. R-QN1	RxBP

(Threatening R-B8 ch.)

52. RxP	



Position after 52. . . . R-K6ch.



A drawn position after 57. RxP

(The Rook tastes freedom at last.)

52.	R-K6 ch. ?

(But Boris should have played K-Q4. Now White has a chance to draw.)

53. K-B2	RxP
54. R-N6 ch.	K-K4
55. RxQRP	R-R7 ch.
56. K-N3	R-QB7

(If 56. . .R-R4, 57 R-R5 wins the Black Rook and if 56. . .R-R8, 57 K-N2 R-R5 leads to a draw.)

57. RxP	

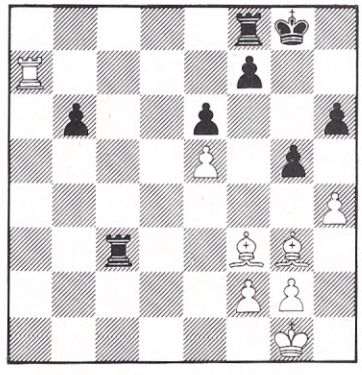
(The game must now be drawn.)

Theme on a Chess Variation

During the 10th ACM Chess Championships, OSTRICH lost its game to CHESS 4.9. At the end of that game, David Levy, Director of The Tournament, commented that there appeared to be a draw for black instead of a loss. The ending was again set up (as shown in diagram), and Levy wagered a buck he could find the draw playing at speed tempo. He didn't, and lost his buck to David Slate. Morris Miller analyzed the problem and decided that there was indeed a draw for black. Morris sent along this analysis which appeared in the April issue: "With black to move, I would choose 1- . . .Rb8. If white plays 2-Rb7, black exchanges rooks and simply pushes the pawn. The white queen's bishop is out of the game and cannot easily be brought back, since black will not play PxP?, releasing the white queen's bishop.

"Even after 1- . . .Rb8 2-Bh5, black simply pushes the queen's knight pawn on; or else black can even play 2- . . .Rc6, holding the king's pawn and giving up only the bishop's pawn. The queen's knight pawn costs white a piece.

The Levy challenge . . .



. . . can black draw?

"The situation would be different if white had some passed pawns, or an unbalanced pawn position which could lead to the creation of a passed pawn. But with all the pawns on one side (except the black queen's knight pawn), **I don't see how white can do better than draw."** — *Morris Miller*.

. . . "Not so," says David.

"The position in question is certainly a win for white. I said so at the time. The point that I was trying to make was that I could draw this lost position as black, if CHESS 4.9 has only a **few** seconds per move. I was wrong.

"Morris Miller's annotations are wrong. If black plays 1 . . .Rb8, white plays 2 Bh5 with a winning position. Two examples:

"a) 2. . . b5 3 Bxf7+ Kh8 4 Bxe6 b4 5 Bf5. Black will soon lose his h-pawn and even if white is forced to sacrifice his bishop on b1 for the advancing pawn, he will still be left with rook, bishop and three pawns for two rooks, an easy win.

"b) 2. . . Rc6 3 Rxf7 b5 4 Rf6 b4 5 hxg5 hxg5 6 Rg6+ Kh8 7 Rxg5 b3 8 Bg6. Here white will have only two pawns, rook and bishop for two rooks, but even so he should eventually win with best play, and there may be something better for white than the line I suggest above.

"If black ever plays . . .gxh4 or . . .g4, the white bishop on g3 will come into play with devastating effect, possibly even allowing white to build a mating net."

Micro-Computer Chess

BY GEORGE KOLTANOWSKI

The Applied Concepts Company has come forth with the BORIS/SARGON 2.5 Micro-Computer chess board that plays in a most remarkable manner. You make your move — and the Modular Game System answers by lighting up the squares where it wants its piece to move!! You can play the machine on six different levels, in fast, slow or tournament chess modes. You can make it play the White pieces or solve Chess Problems with the greatest of ease. It's really a delight to play against. It comes with a cassette, which can be replaced by another that plays "unbeatable" Checkers, and later on with an improved, upcoming BORIS 3 cassette. Look it over — you will find it in many stores. I have tested BORIS/SARGON 2.5 on the first four levels on the Max Lange Attack. Up to the 3rd level, the games went as follows:

G.K. White	SARGON 2.5 Black
1. P-K4	P-K4
2. N-KB3	N-QB3
3. B-B4	B-B4
4. 0-0	N-B3
5. P-Q4	BxP
6. NxB	NxN
7. P-B4	P-Q4(a)
8. KPxP	B-KN5
9. Q-Q2	P-QN4
10. PxP	PxB
11. PxN	N-K7ch
12. K-R1	PxP
13. R-K1	Q-K2
14. P-KR3(b)	

a) Surely 7 . . .P-Q3 is much better
b) If 14 . . .P-KB4 or 14 . . .P-KR4; 15. N-B3, etc.

From the 4th level of play on Sargon 2.5, which represents tournament play, namely, 40 moves in two hours:

G.K. White	SARGON 2.5 Black
1. P-K4	P-K4
2. N-KB3	N-QB3
3. B-B4	N-B3
4. 0-0	NxP
5. P-Q4	PxP
6. R-K1	P-Q4
7. BxP	QxB
8. N-B3	Q-B5(a)
9. NxN	B-K3
10. B-N5	B-QN5(b)
11. P-B3	PxP
12. PxP	BxP?
13. R-QB1(c)	

a) 8 . . .Q-QR4 is the theoretical move here.
b) Surely 10 . . .B-K2 was best.
c) And White should win with correct play.

I did not try it on level 5 or 6 — too much time elapses between moves. What surprises me is why the computer does not avoid the Max Lange altogether:

1. P-K4	P-K4
2. N-KB3	N-QB3
3. B-B4	B-B4
4. 0-0	P-Q3.

BORIS/SARGON 2.5 is the brainchild of Kathe and David Spracklen of San Diego, California. Computers are improving all the time! Boris/Sargon 2.5 is supposed to come up to a United States Chess Federation rating of 1800 (A class).

I set up the following position on the BORIS/SARGON 2.5 board, just to see how it would play this line for black. I tried it on the fourth level of play. It should be of interest to all who have my "Colle System" 10th Edition.

G.K. White	Sargon 2.5 Black
1. P-Q4	N-KB3
2. N-KB3	P-Q4
3. P-K3	P-K3
4. B-Q3	B-Q3
5. N1-Q2	N1-Q2
6. 0-0	0-0
7. P-K4	PxP
8. NxP	NxN
9. BxN	P-KB4
10. B-Q3	P-K4
11. B-B4ch	K-R1
12. N-N5	Q-K1
13. PxP	NxP
14. R-K1	P-B5
15. Q-Q4	Q-R4
16. RxN	BxR
17. QxB	Q-Q8ch
18. B-B1	B-N5(a)
19. B-K3	QxR(b)
20. B-Q4	R-B3
21. Q-K7	R-KN3
22. N-B7ch	K-N1
23. N-K5	R-K3
24. Q-B7ch	K-R1
25. NxB	R-KN3
26. N-R6! (c)	

a) That's the position I set up.
b) If 19 . . .PxB; 20. RxQ, PxPch; 21. K-R1. BxR; 22. Q-K4 wins.
c) Threatens 27. Q-N8ch, RxQ; 28. N-B7 mate.

Of all the Chess Micro-Computers on the market today — BORIS/SARGON 2.5 is easily the most imaginative! It should be helpful to all amateurs up to strong B level (1799 Rating)!



During a lull in the 10th ACM tournament in Detroit, Kathy Spracklen (of Sargon fame) played against Tom O'Neil, manager of the famous Manhattan Chess Club (NY). We agreed not to divulge who won this human chess match. We can say, however, that Kathy did quite well. (In fact if you can count the pieces in the photo, you will see that at this point, Kathy is already a pawn up and she has pushed her attack into Tom's territory.)

On the Side of Justice

The March issue of CHESS CANADA ECHECS (official publication of The Chess Federation of Canada) featured the following letter:

"This is a rebuttal to the Curtis Materi letter in a previous issue. Materi has listed several arguments for barring computer algorithms from tournament play.

"His first argument is the most serious. It is that computers take away from the interest and the fun of competitive chess. This has simply not proved to be the case. In fact, chess programs have been star attractions wherever they have been entered in competition! Admittedly, there may come a time when an algorithm attains a playing strength that puts it out of reach of human competition. However, this will not be for some years yet (the strongest program has a rating of 2050, while commercially available ones have a strength of about 1100). At that time, it will be appropriate to rethink computer participation in human tournaments.

"Mr. Materi's second argument is that playing against a computer is demeaning. I think this sort of feeling is rare. In any case, it should not permit a player to forfeit a game, in the same way that it does not when playing against women, or children, or Blacks, or Jews, etc.

"I hope that Mr. Materi's last argument is hyperbole. Come on now, the annihilation of chess by the dread computer? The king of games has a long life ahead of it! Computer chess is both a tribute and a contributor to the popularity of chess!

Very truly yours,
PIERRE TOURIGNY"

(CHESS CANADA ECHECS, edited by Jonathan Berry, is written in English and is crammed full of interesting news of Canadian chess events and tournaments open to US residents. To obtain a sample copy of this magazine ($2) write to Jonathan Berry, The Chess Federation of Canada, Box 7339, Ottawa, Ontario, K1L 8E4.)

Classifieds

COMPUTER GAMES, ETC.

Rates for advertising in this section: $1 per word. Minimum. 15 words. Allow two months for appearance (usual publication lag). Announcement of human tournaments that are open to computers published without charge. Send all submissions for this section to COMPUTER CHESS CLASSIFIED DEPARTMENT.

SARGON 2.5 MODULAR GAME SYSTEM

INSTITUTIONAL COMPUTER DEVELOPMENT CORP. is a mail order company unlike any other; we have an ear, voice, and conscience. Our business is microcomputers manufactured by Boris and Fidelity. SARGON 2.5, AUTO-RESPONSE BOARD, DIPLOMAT, CHESS CHALLENGER "7", "10", VOICE, BRIDGE, BACKGAMMON, CHECKERS "2" and "4". For expert advice, product information, and questions call (516) 872-3333 from 3 PM to 4:30 PM Eastern Time. Or call evenings (516) 623-6826 from 8 PM to 10 PM Eastern Time. For quotes on lowest prices only call (516) 872-3532 from 8 AM to 4:30 PM Eastern Time. Purchase price will be reduced by $2.00 to cover cost of call. Or write I.C.D. CORP., PO Box 474, Merrick, NY 11566.

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Explore, enjoy checkers! Send for rules, pointers, sample magazine, membership benefits. Our bet: $5,000 on World Champion Tinsely against any computer! American Checker Federation, 3475 Belmont Ave., Baton Rouge, LA 70808.

NEW! SARGON/BORIS 2.5

Chafitz modular games system featuring the world's strongest playing microcomputer chess program! (Plays above 1500 level in tournament time.) We have SARGON 2.5 plus the Response Board in stock and available for immediate delivery! Write or phone, 24 hours a day for free discount price list, brochure, and an in-depth technical report. Palmer, McBride and Kincaid Associates, PO Box 598, East Brunswick, NJ 08816. Tel. (201) 246-7680.

TAPE 'N TEXT:

Learn how to program your own computer games! Introducing our best selling BASIC Programming Course – used in over 700 schools and businesses. You can acquire proficient use of the language. Order your personal copy today! BASIC Programming Course consists of 12 audio cassette tapes with 12 printed texts. The tapes are narrated by William R. Parks. It sells for $59. Tape 'n Text, Williamsville Publishing Company, PO Box 250, Fredonia, New York 14063.

ENTER A GOMUKU TOURNAMENT

Do you have a GOMOKU program? Would you like to write one? Those with own programs can enter an International GOMOKU Tournament and, if # 1, can take on the European champ. (The following individuals are looking for people to play GOMOKU with: Robert Brandenburg, 9515 Clubhouse Lane, Tampa, FL, 33615; Ed Slodysko, Jr., 1118 Valley Drive, NW, N. Canton, OH 44720.) For more information on the GOMOKU Tournament itself, write to Dr. Shein Wang, Institute of Computer Science, U. of Guelph, Guelph, Ontario, N1E 1C8.

BRIDGE PROGRAM

For those who would like to add my standardized bridge dealing sequence to their Duisman programs: If they will send me a check for $3 (to cover incidental costs) I shall be glad to send the code. Thomas A. Throop, 8804 Chalon Drive, Bethesda, MD 20034.

GOMOKU FOR MICROS

Play an intelligent game at university level! Five Stones Software's GOMOKU program is available for North Star or CP/M in 5-1/4" single or double density disks or in 8" single density disks. Also available in cassette for TRS-80, Level II, 32K. $29.95, any choice. Visa or Mastercard accepted. Five Stones Software, PO Box 1369, Station B, Ottawa, Canada, K1P 5R4.

OTHELLO FOR TRS-80

Intelligent OTHELLO opponent for both novice and expert. Five levels of play, neat graphical display, move selection in 30 seconds or less. TRS-80 tape ($12) requires Level II and 16K and has REAL-TIME Lunar Lander program on flip side. Apple tape ($16) requires integer BASIC and 24K and has OTHELLO for Disk system on flip side. Peter Frey, 2407 Prospect Avenue, Evanston, IL 60201.

BACKGAMMON CASSETTE:

The GAMMON CHALLENGER gives all backgammon players a battle. Has 3 levels of play. Switches sides, tests problems and stores positions in memory. Available on TRS-80 cassette for either Level 1 or Level 2. $14.95 each. Computer Cablevision, 2617 42nd Street, NW, Washington, DC 20007.

Background and Origins of Othello

"Othello" has been around since 1604 when Shakespeare produced a play with that title. It was the story (not original with him) of a Moor named Othello who suffers a series of misfortunes. Stirred into a frenzy of jealousy by a cunning, philandering Venetian soldier — who had been rejected as a lover by Desdemona, Othello's wife — Othello murders his sweet, innocent, loyal wife. This characterization of a victim of treachery and deceit has become descriptive of the name. And the plot itself is the derivation of the name of a current popular game of "flipping-the-stones".

The game, as we know it today, was invented by a Japanese chemical engineer, Goro Hasejawa, in 1974. He was seeking a simple variation of the complex game of GO (Japan's most popular board game) and eventually came up with a smaller game board (8×8 grids instead of GO's 19×19.) The game was an immediate success in Japan where more than 20 million sets were sold in the first five years of its existence. Today, the modified Hasejawa game is, next to GO, the most popular passive board game in Japan and is that country's leading commercial game product. Hasejawa's father, a professor of English Literature at Tokyo University, was responsible for implanting the name on the game. When Goro demonstrated the new product to his father and asked for title suggestions, the elder Hasejawa saw in it some of the familiar trickery and traps that were part of Shakespeare's story and he suggested Othello as a name.

News on "Intelligent" Games of Backgammon, Checkers, Gomoku, Go, etc., welcomed by this department. Computer Chess and Computer Bridge appear separately. Address all correspondence to Computer Games Dept., Personal Computing.

In 1976, Gabriel Industries of New York received a license to sell Othello in the US and Canada. Since September of that year the company has already sold more than five million sets. Next to chess, Othello is probably the most popular board game in the United States.

Current world Othello champion is a computer programmer from Japan, Hiroshi Inoue. In 1979 he won the Third International Othello Championship in Rome against eight other world-renowned "masters." Finishing in second place for world standing was Jonathan Cerf of the US, this country's current title holder. Inoue is marketing a stand-alone device (like Applied Concept's Boris/Sargon 2.5) that plays a very strong game of Othello. The device has not yet been brought to this country because of production problems. Japanese manufacturers are suffering from as great a shortage of microprocessors there, as are American manufacturers. Once the chip supply eases up, Inoue's box (or perhaps one from an American company) will be on the American store shelves.

The game of Othello is not as new as Hasejawa's invention might suggest. A computerized game called Vice Versa was written in 1978 by Dr. Aurthur Samuel, Professor Emeritus at Stanford University. Dr. Samuel is best known for his 1953 AI research for IBM. He wrote the first machine program to play a complete, legal game of checkers against a human (even managing to win a few games against human players). "Vice Versa," explained Dr. Samuel when he introduced the game in 1978 for Video Brain Inc., "is a modern computer version of a 19th century board game called 'Reversi.' It comes from the same family as the oriental games of 'GO' and 'GOMOKU.' There have been other versions before this one but none of them have managed to enjoy the popularity this fast-paced and captivating game deserves. In the manual version, playing involved the tedious chore of turning the stones by hand and counting them up at the end of the game. But the computer program reverses the pieces automatically and infallibly. It also keeps score and keeps you from making illegal moves. It will even play against you with five computerized opponents of varying skills."

Briefly, Othello is a game whose object is to finish with more of your pieces on board than your opponent's. The game ends when neither player can make a move (usually when all 64 available spaces on the 8×8 board are occupied). Each player takes a turn in placing his chosen-color stone (black or white) on an *empty* square. The square on which the stone is placed *must* be immediately adjacent to an opponent's piece. A stone can only be placed on a square so that an imaginary arrow drawn from your stone will cross an opponent's stone and touch another of your stones without crossing empty squares. To start off the game in conformity to the above conditions, the board's starting position begins with two black stones and two white stones placed in the four center squares and all stones touching each other.

When two stones of one color outflank stones of another color (all in an unbroken sequence) then all the enemy stones become the property of the flanking stones and the enemy's stones are turned over so that the color is now the same as the victorious stones. Sometimes a piece can be placed so that it outflanks (and captures) one stone, one row of stones, or one group of stones. These, basically, are the strategies of Othello. It is a game with rapidly changing fortunes. A player may capture a row of enemy stones only to find that on the very next move his whole bounty in turn, has been captured by the enemy. He may even be

tricked into making a capture only to discover that he has fallen into a trap. That, say Othello addicts, is the concept that makes the game interesting. Unlike chess, where the ending becomes apparent when one player has material advantage, in Othello a player with a majority of stones may suddenly find himself deprived of his fortune and hanging on to a few stones for dear life. Probably the best advice to follow when playing this game is "never listen to a Venetian soldier who casts dark, bloodshot eyes at your beautiful fair-skinned wife."

First US Othello Tournament

Information on the proposed first "official" US Othello tournament has been provided by Peter Frey. By the time this article appears in print, the tournament will have ended. The events that will have occurred will be reported in a future issue of *Personal Computing*.

On *March 18,* Peter wrote: "The main thrust of the Othello tournament will be to find which computer-Othello program plays best against humans, not which is the best program. More than 200 people had indicated a pre-tournament intention of attending. In addition, because the tournament is taking place at the same time as the Chicago Consumer Electronics Show, wide coverage from press, radio and TV is expected. More than 600 press representatives are expected to attend that big electronics show and many of them might drift over to our nearby Northwestern campus to see this first computer Othello tournament.

"I am arranging the tournament to be held on June 19 at Northwestern University in Evanston, Illinois. I have reserved a large meeting room (the Louis room) at the Norris University Center from 8:30 a.m. to 5 p.m. on Thursday, June 19th. This building overlooks Lake Michigan and is centrally located on the university campus.

"The tournament would involve 3 rounds and would have 8 contestants. My present plans call for 5 or 6 of these contestants being machines and 2 or 3 being expert human players (hopefully including Jonathan Cerf, the present U.S. champion). The machine contestants would include programs written by myself, by David Levy of London, by one of Hans Berliner's students at Carnegie Mellon, and by two or three others. Some of these programs would run on small personal computers and some would run on large mainframe computers connecting by telephone lines to the tournament site. At present the list of participating programs includes the following (hopefully they will all appear:)

PET program by David Levy,

PDP-11 program by a Carnegie-Mellon group sponsored by Hans Berliner,

TRS-80 program by Peter Frey,

Program by Hiroshi Inoue (World Othello Champ.) It is expected that Hiroshi will bring his commercial 'black box' to play. If he cannot make it, arrangements have been tentatively made to have him represented.

Program by Kathe Spracklen, (world-champion microcomputer-chess programmer with her Boris/Sargon 2.5 unit.)

The sixth program had not been chosen at the time of this writing. It was an open slot. However, five additional programs were on stand-by waiting for the call.

"At this writing," continues Prof. Frey, "there are several key questions still to be worked out. We need a sponsor to cover the communication cost for those computers which are not physically located at the tournament site. Hopefully we are talking about 2 or 3 telephones and possibly $400 or $500. Another desirable arrangement would be to find a sponsor who will offer a prize to the winner. Such a prize would encourage participation by the best human players and the best computer programs and would increase media coverage. If this first tournament turns out to be good, the succeeding ones will be huge successes."

Rules for the Othello tournament will probably include the following:

1) Each move should be communicated between contestants using the algebraic notation which is currently standard in international chess competition. (Columns are labeled A through H from left to right and rows are labeled 1 through 8 from bottom to top. Squares are specified by giving a letter and a number; e.g., an opening move in Othello might be "E3").

2) In order to complete the tournament in one day, I suggest a time limit be placed on each game. Each player would be given a total of 30 minutes for each game. This timing requirement could be implemented using a standard chess clock. No special allowances would be provided for computer hardware failure or communication problems. By establishing this rule, each game could be completed in 1 hour or less.

3) Since the player who goes second in Othello has an advantage, each pairing would consist of two games with the color of the pieces reversed between games. The winner would be based on point differential if each player won one game.

4) Tournament pairings for the second and third rounds would be based on the Swiss system, winners being paired with winners and losers being paired with losers.

5) Barry Schwartz, PR representative of Gabriel Industries, will be the official tournament judge. **—P.F.**

Machine Othello

BY PETER W. FREY

The past decade has seen an exploding resurgence of interest in a board game that was once popular in Europe many years ago. Gabriel Industries is currently marketing a game called Othello (based on the ancient game of Reversi.) Players claim that it is more challenging than checkers, more exciting than chess, more ruthless than backgammon! The game also has the distinct advantage of being completed in about 20 to 30 minutes.

My interest in Othello is an outgrowth of a research project which I started several years ago to examine the psychological basis of chess skill. Chess is a challenging game that requires years of practice before one can acquire reasonable proficiency. A number of informative research investigations have explored the determinants of chess skill in experienced players. There is almost no information, however, revealing the developmental process which takes place when a person is learning to play chess. The most logical explanation for this important gap in our knowledge is simply the tremendous time investment that would be required to conduct a detailed study in this area.

About a year ago I began to explore this research issue within the framework of a different game. Othello appeared to have important advantages over chess for that purpose. Two key factors were its obscurity and its counterintuitive strategy. Because the game was not well-known in this country (it is more popular now), I had no difficulty in recruiting subjects for our research who had never played the game. The specialized strategic knowledge required in the game makes it easy to determine when a player becomes aware of important playing principles. As a new player becomes more experienced, one can observe major changes in his move selections which indicate that he is beginning to grasp essential strategic ideas.

Early in my research I developed a computer program which could play the game of Othello. By using a machine Othello player, I would know that my subjects were learning to play against a predictable, consistent opponent. Because the playing strength of the program was adjustable, the subjects were able to practice in an environment where they won about as often as they lost. Each time the subject won, the strength of the program was increased. Each time the subject lost, the strength of the program was decreased.

My Othello program was written for the TRS-80. It requires Level II BASIC with 16K of memory. Because move selection is based on pattern analysis rather than lookahead search, the TRS-80 selects its moves quickly. At lowest strength level, a move is chosen in about 5 seconds. At strongest level, 20 to 30 seconds are required. This programming strategy does not produce as strong a player as would a lookahead search. Despite this, the program provides a reasonable level of competition for beginning players and will often put up a good fight against an experienced player.

I have selected one of the program's games to demonstrate both its strengths and weaknesses. This game is neither its best nor its worst effort. To describe play, two different diagram types are used.

Diagrams 1, 3 and 5 provide a list of moves numbered in order as each piece was placed. Diagrams 2, 4, and 6 present the Othello board as it appeared at key points during the contest. In this game, black is the human player; white, the computer. The human player had chosen the black pieces and therefore, by established rules, played first.

Diagram 1 shows the first sixteen moves. Both players are shown adopting a conservative strategy. When possible, each restricted his piece placements to the central squares. This strategy prevented the opponent from gaining access to edge squares. In Othello, it is important that each player gain several secure base positions at the edge of the board. Such positions act as launching points for critical assaults on corners. The battle for corners generally takes place in the final stages of the contest. It is the most exciting part of the game and blends direct attack with subtle deception. After sixteen moves, the central squares are completely occupied and the battle now moves to the bridge and edge squares. Diagram 2 presents the board as it existed at this stage of the contest.

Beginning players often lost the game during the first few moves by

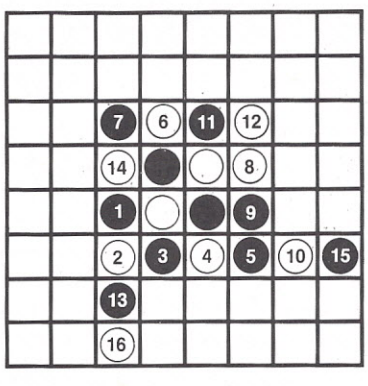


Diagram 1. Initial moves

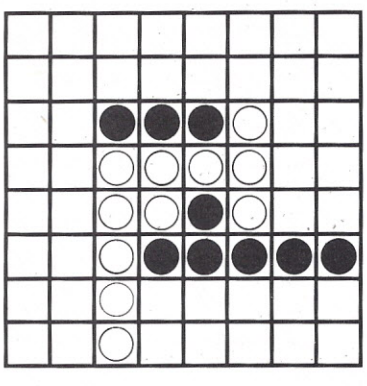


Diagram 2. Board after 16 moves

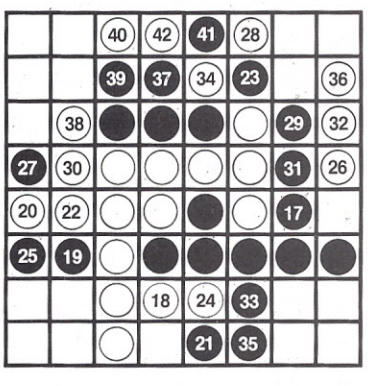


Diagram 3. Moves 17 to 42

placing a piece on a square adjacent to one of the corners. It is essential for survival to avoid playing next to corners. As the game progresses, each player will attempt by force or guile to maneuver the opponent into playing next to one of the corners. This is a key strategic idea which governs the middle game. Diagram 3 presents moves 17 to 42. Note that the human's 25th move has created a difficult problem for the machine. To retain control of the left edge, the machine would have to play next to the corner. The machine's 26th move, however, avoids this predicament and abdicates the entire left edge to the opponent. Even experienced players often attempt to retain control of the edge in this situation. Such a move at this early stage of the game could be a major strategic error.

The machine played a steady middle game and after 42 moves appeared to be in a strong position. The only weakness in the machine's game was the 36th move in which it played next to the corner. It is not clear that the machine had had a better move to make at that time. Diagram 4 shows the board after the 42nd move. At this juncture, it is

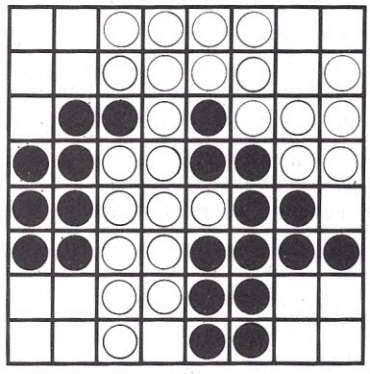


Diagram 4. Board after 42 moves

the human's turn to move and all options look bad. The machine appears to have reserved a safe move for itself at the upper portion of the left edge. The human, on the other hand, appears to have no safe move. A play in the middle of the bottom edge will give away that entire edge. All other move possibilities give the machine an immediate opportunity to win one of the corners.

The fascination of Othello is that a game which appears to be totally lost can often be resurrected by skillful play. The next few moves by the human player were very carefully considered. Play at this stage of the game is greatly helped by a careful lookahead search. My program does not do this and is not

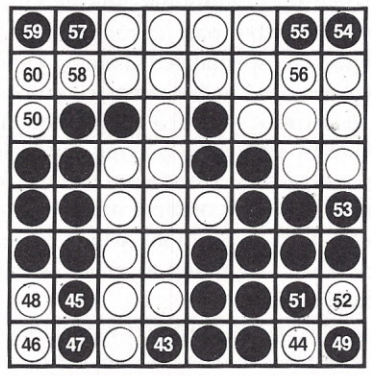


Diagram 5. Moves 43 to 60

as strong as it might be because of this shortcoming. The human player clearly does plan ahead and the outcome of the contest demonstrates the advantage of being able to do this.

The human's 43rd move sets up a series of moves which leads to victory. The machine is faced with a difficult choice at the 44th move. It decides to move next to the corner and retain control of the lower edge. This creates a dangerous edge pattern which the human player immediately seizes. This 45th move takes advantage of the machine's vulnerability. Although the machine immediately wins a corner with its 46th move, the human wins both a corner and most of the lower edge with his 47th and 49th moves. If the machine did not take the corner on move 46, however, the human could capture the entire diagonal at the 47th move and force the machine into a dangerous dilemma. After the first 49 moves, the chances of the two players are virtually dead even. The first losing move for the machine comes on its 50th move. It should have played on the square later selected by the human for his 51st move. Because of this misplay, the machine ran out of moves and was forced, on its 52nd move, to give the opponent access to the upper right-hand corner. After move 53, the machine (like Desdemonia) can only hang on and pray for a miracle. The final victory

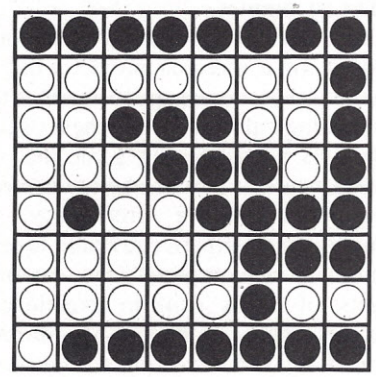


Diagram 6. Final position

goes to the human player, but by a very close margin, 33 to 31. This was a hard fought game which demonstrates some highlights of Othello and the personality of my own Othello program.

(This program has been duplicated using a digital recording technique and is available from the author. See ad in Computer Chess Classifieds for information.)

A London Program

David Levy, International Chess Master, world traveler, and perennial director of ICCA's Computer Chess Tournaments (at annual ACM conferences) has written his own Othello program which he has already launched into combat. He describes his machine prodigy in the following note:

"I wanted to let you know about my program before I fly off to the Far East in half an hour. My program is currently running in Pascal on an IBM mainframe, but is being rewritten in 6502 assembler and will run on the Pet. It was scheduled to participate in a computer Othello tournament in Paris on May 11th.

"I have not yet had a chance to test Peter Frey's program against our own. When I return I will borrow a TRS-80 and do so. From his description of it, however, I would not think it fair to play a match for any stake between his program and our stronger assembler version."

More Duisman Deals

BY THOMAS A. THROOP

This month we'll discuss a few more deals generated by my standard dealing modification to the Duisman program. The first deal is 56, played at 4 spades.

Deal #56:

NORTH
(Dummy)
♠ J9
♥ A10942
♦ 94
♣ K1043

COMPUTER WEST
♠ K75
♥ J83
♦ K8752
♣ A2

COMPUTER EAST
♠ 432
♥ 65
♦ Q1063
♣ 8765

SOUTH
(Declarer)
♠ AQ1086
♥ KQ7
♦ AJ
♣ QJ9

The Duisman program leads the 3 of hearts against the 4 spade contract. The program generally dislikes leading away aces and kings, which explains the heart lead. You should have easily made the contract with an overtrick, losing only the king of spades and the ace of clubs.

My line of play was to play the 9 of hearts from dummy at trick 1, which won. Then I led the jack of spades from dummy and played low from South's hand to finesse for the king. The finesse lost to West. The TRS-80 version of the Duisman program now returned the jack of hearts, while the Pet version played the 5 of spades. In either case, you simply draw the enemy trumps and lose only one more trick to the ace of clubs. Your diamond loser is discarded on one of the long hearts or the long club in dummy.

The next deal is 58, played at 4 hearts.

Deal #58:

NORTH
(Dummy)
♠ A97
♥ AJ104
♦ K9
♣ Q1092

COMPUTER WEST
♠ J1086
♥ 95
♦ 85
♣ KJ864

COMPUTER EAST
♠ Q42
♥ K32
♦ AQ763
♣ 73

SOUTH
(Declarer)
♠ K53
♥ Q876
♦ J1042
♣ A5

Looking at the North-South cards, your chances of making 4 hearts appear very good. If the king of hearts is on side or if either the ace or queen of diamonds is in the West hand and you can guess right if the defense does not help you, then you will very likely make the contract. You'll still have to maneuver a spade discard, either from dummy on one of your diamond honors or from your hand on the queen of clubs if West has the king.

Both the TRS-80 and the Pet version led a diamond from West against 4 hearts. The TRS-80 version led the 8, a normal choice from the top of a doubleton, while the Pet version led the 5. Hoping that West had one of the diamond honors outstanding and believing that the Duisman program is more apt to lead away a queen than an ace, I played the 9 from dummy at trick 1. Unfortunately, this lost to East's queen.

East now switched to the 7 of clubs. I played small, and West won with the king. West now continued with his remaining diamond, king from dummy, and East won with the ace.

The fate of the contract now hinges on the heart finesse. After East's club return, which I won with the ace, I played my queen of hearts to finesse for the king. As you can see, the finesse lost for down one. The defense won two diamonds, one club and one heart. The tableau below shows the complete play of the deal:

	W	N	E	S
1	8D	9D	QD	2D
2	KC	2C	7C	5C
3	5D	KD	AD	4D
4	4C	9C	3C	AC
5	5H	4H	KH	QH
6	9H	10H	7D	JD
7	6S	AH	2H	6H
8	6C	JH	3H	7H
9	8C	QC	3D	3S
10	8S	AS	2S	5S
11	10S	7S	4S	KS
12	JS	9S	6D	8H
13	JC	10C	QS	10D

Contract: 4 hearts
Tricks N-S: 9 Tricks E-W: 4

The next deal, number 60, is the most interesting of the deals for this month. How many of you made the 2 no-trump contract?

Deal #60:

NORTH
(Dummy)
♠ KJ109
♥ K3
♦ 62
♣ AJ542

COMPUTER WEST
♠ A6
♥ J842
♦ Q95
♣ Q863

COMPUTER EAST
♠ Q7432
♥ 109
♦ K1083
♣ K9

SOUTH
(Declarer)
♠ 85
♥ AQ765
♦ AJ74
♣ 107

The TRS-80 Duisman program opens the 5 of diamonds against the 2 no-trump contract. You play small from the dummy, and East plays the king. Looking only at the North-South cards, what is your best line of play? I believe your best line of play is to win East's king with your ace and then lead a small spade toward dummy to finesse West for the queen. This I did, losing to East's queen as the cards lay.

The play continued as shown in the accompanying tableau. At trick 3 East played the 3 of diamonds, I played the 4 from South, and West won with the 9. With the cards as they are,

	W	N	E	S
1	5D	2D	KD	AD
2	6S	9S	QS	5S
3	9D	6D	3D	4D
4	QD	2C	8D	7D
5	AS?	10S	2S	8S
6	6C	AC	9C	7C
7	3C	JS	3S	10C
8	8C	KS	4S	5H
9	2H	KH	9H	6H
10	4H	3H	10H	AH
11	8H	4C	7S	QH
12	QC	5C	10D	JD
13	JH	JC	KC	7H

Contract: 2 no-trump
Tricks N-S: 8 Tricks E-W: 5

almost any play by West is very helpful. As West, the Duisman TRS-80 version cashed the queen of diamonds at trick 4 and then cashed the ace of spades at trick 5. Cashing both of these cards is not the best defense, since these plays simply set up tricks for the declarer. I now was assured of making two spades, at least three hearts, two diamonds, and one club for a total of at least eight tricks.

West now led the 6 of clubs. I went up with dummy's ace, cashed the top spades, and then cashed the top hearts and the jack of diamonds. With the hearts not splitting evenly, the last trick went to East-West. Thus, my result was making 2 no-trump.

The Pet version opens the ace of spades against the 2 no-trump contract, followed by the 6 of spades. You play the 10, losing to East's queen. East now returns the 7 of spades, which you win with dummy's jack. If you now cash the three top hearts and then concede a heart to West's jack, the computer program commits a serious error on the next trick. West leads the queen of diamonds, on which East plays his king!? This sets up your jack of diamonds, and you have the rest of the tricks, thus making 3 no-trump for an overtrick.

Regarding deal 67: I had another deal in mind, rather than number 67. However, if you played this deal, you may have been able to make 1 no-trump, 2 hearts or 2 diamonds.

For those of you who would like to add my standardized dealing sequence to your Duisman program, please note the announcement in the Classified section of the Chess department. For those who already have the standard dealing sequence or are planning to order it, here are a few more interesting deals to play: deal 75 at 3 no-trump, deal 80 at 3 no-trump, deal 86 at 4 hearts, and deal 87 at 4 spades. I'll comment on these deals in next month's column.

One of the letters I received this past month was from Laurence Pope of 33 Falmouth Street, Mairangi Bay, Auckland 10, New Zealand. He writes, "I should like to begin by saying how interested I was in the article entitled "Computer Bridge" which was in the January 1980 edition of *Personal Computing*. I did not realize that any programs existed for bridge play and had decided, if I ever became proficient enough, to try to write one. I own a TRS-80, Level 2, 32K machine with a floppy disk. I am interested in obtaining a program similar to the TRIK program you mentioned."

Another letter received was from Barry Bayer of 2842 Walnut, Homewood, IL 60430. He writes, "My bridge playing friends claim that bridge is a much more difficult game to program than chess. I suspect that the problem is simply that a lot more effort has gone into chess programming. I'm curious as to your opinion."

As I have stated in several of my past columns, I completely agree that bridge is the more difficult game to program. Chess is a game of perfect information; that is, the location of each piece is known. The chess programs, by and large, simply evaluate an enormous number of alternative positions. The key to these programs is the set of scoring algorithms employed to select a move resulting in the best position. Bridge, on the other hand, is a game of imperfect information. The location of all the cards only becomes known during the play of a deal. All of the existing bridge programs, including mine, are designed to play a bridge deal as would a human player deciding how best to proceed with the imperfect information available.

At least two manufacturers have underestimated the difficulty of programming a computer to play bridge. The first product of Fidelity Electronics for playing bridge is, in my opinion, a disaster, just for this reason. Tryom, Inc., missed last year's Christmas market with its announced product for the same reason, the failure to commit the proper resources to developing good bridge software.

If you are writing a bridge program, or have played against new programs, kindly let me know. I am collecting information on all facets of computer bridge for a future column . — Tom Throop

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Home Computers Can Make You Rich

Home Computers Can Make You Rich, by Joe Weisbecker; Hayden Book Company, Inc., 50 Essex St., Rochelle Park, NJ 07662; 122 pp.; $5.95 paperback.

If you're interested in profiting from the new and expanding microcomputer market, or own a home computer and want it to help supplement your income, read *Home Computers Can Make You Rich*. Author Joe Weisbecker shows you how to use your microcomputer, or computer knowledge, to make money in both the home and business market. Weisbecker offers dozens of suggestions, some small scale, others involving more time and knowledge. Along with this supply of money-making methods, he offers insight into the microcomputer industry.

Weisbecker's enthusiasm for the exploding microcomputer industry shines again and again as he discusses the money-making opportunities available.

The carefully planned 11-chapter book leads off with an overview of the microcomputer industry. Although the book was written primarily for people who've heard computer terms before, a novice could read and understand it, and learn along the way. Weisbecker admits that he has "a tendency to forget that there are people who don't know about home computers yet."

Following chapters provide more background on actual money-making principles, problems and patterns, plus other ins and outs crucial to a successful business operation.

One chapter is completely devoted to lists and explanations of resources available for potential money makers. These books, magazines, stores, clubs and other aids offer readers essential contacts and plenty of material to bone up on computers.

Serious money makers will eventually have to purchase a computer system to maximize their success and profit. Weisbecker gives a quick survey of the most popular systems available and some hints on what you'll need to accomplish your goals.

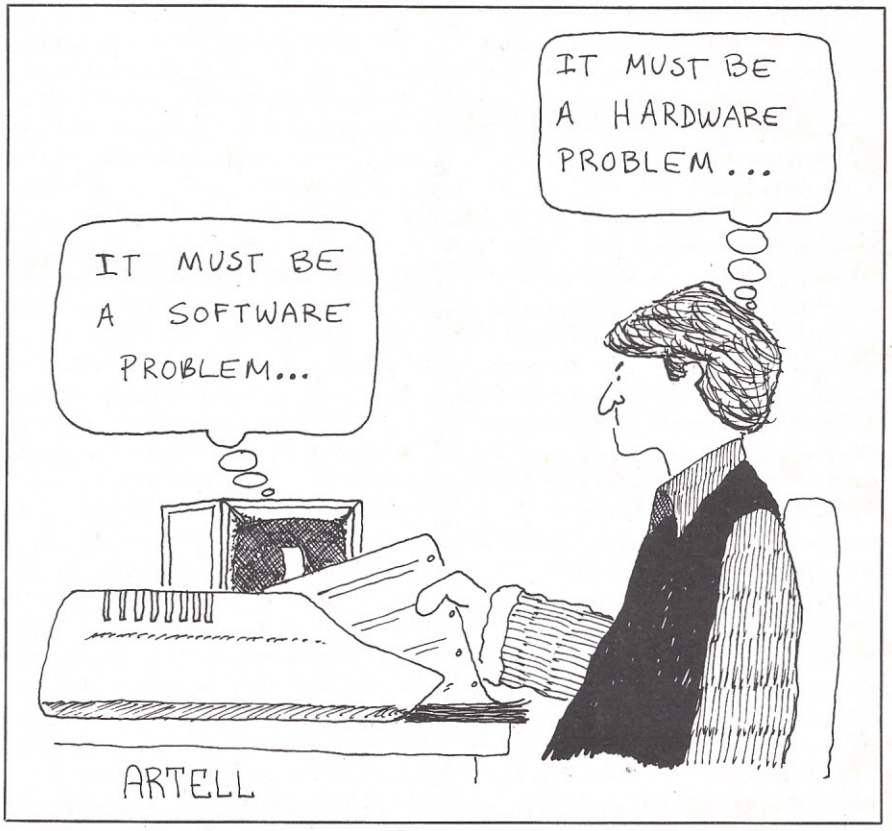
Weisbecker's suggestions include writing articles, programs, newsletters and books; selling services — repair, consulting, hardware; and inventing gadgets, games or tools. The reader should keep in mind that actual implementation of any of these ideas requires lots of work and dedication. And, not all of these ideas are suited to everyone. "It is up to you to evaluate, select, and modify these ideas so that they will work for you," says Weisbecker. And, he cautions, don't just get caught up in the enthusiasm and never actually begin a project. "Talking about what you're doing can become a substitute for doing it," he warns.

Of course, successful involvement in most of these money-making tasks will require expertise as well as enthusiasm. If you want to write programs, you'll have to become a good programmer. If you want to produce microcomputer accessories and gadgets, you'll need a substantial electronics background and a solid sense of what users need now and what they'll need in the future. Weisbecker stresses this point; he doesn't guarantee that just reading his book will make you a millionaire. "The microcomputer industry is evolving so rapidly that watching it closely is especially important if you want to find new spare-time money-making opportunities. To be successful you will have to learn to spot trends, recognize potential dead ends, and predict the popularity of new products."

And, with the belief that "money can buy happiness," Weisbecker offers these suggestions in hopes of providing at least a few readers "financial freedom."

Armed with Weisbecker's book, spare-time, patience, dedication and unlimited enthusiasm for the future of computers (not to mention a desire to make money), serious readers may be able to join the growing crowd and strike gold in this world of the silicon chip.

— Reviewed by Marjorie J. Morse



Data Management Made Easy

BY KEN MAZUR

Ability to handle many different tasks is one of the strong points of any microcomputer and the CCA Data Management System (DMS) from Personal Software illustrates this ability well.

Available for Apple II (48K), Apple II Plus (48K) and TRS-80 (32K) disk systems, DMS can be used for inventories, accounts payable or receivable, customer lists, a magazine article index, a recipe index and so on. In fact, if you organize information you use frequently into a filing system, DMS can make your task a lot faster and easier. DMS lets you perform all the operations you might want to perform on that file: you can add and delete records, update individual items, sort in any order and print mailing labels or reports.

DMS arrives in bound, looseleaf notebook format with the programs on cassette tape; you transfer them to disk. The excellent documentation, 130 pages worth, guides you through every stage of learning how to use DMS to its fullest.

The manual is divided into six parts:

- *Introduction* contains background information about DMS and the microcomputer system you purchased it for.
- *Getting Started* gives you everything you need to begin using the program package.
- *More About DMS* provides additional points about DMS operation that you will find useful after you have familiarized yourself with the previous section.
- *Information for Programmers* gives material about the DMS record structure so that you can write your own Basic programs to use in conjunction with DMS.
- *DMS Messages* explains all the messages that DMS can give you in normal operation. (More about these messages later.)

There are also appendices which illustrate useful DMS applications and examples.

The first thing to do when you receive DMS (*after* reading the manual) is to transfer the DMS programs from cassette to disk. You can accomplish this simply by following the step-by-step instructions in the manual. Even if you've never used a disk system, the directions are so clear and detailed (at least the TRS-80 version of the package) that I think you could successfully make the transfer.

The only problem I experienced with the DMS package was at this point; I couldn't seem to get the cassette to load into the CPU and I spent a lot of time playing with the volume control of the cassette recorder. I tried loading the individual programs from the cassette using the file names given in the manual but the asterisk just wouldn't start blinking. Finally, I decided to rewind the tape and typed CLOAD to take the first program off the tape. I got a successful load. From that point on, I just CLOADed each program off the tape (there are seven individual programs) as it came up and LISTed it to be sure I had the proper program. Then I SAVEd it under the right filespec (common term for file specification or name).

The seven programs are transferred to a disk that you create by backing up a system disk and then killing files that you won't need in order to make room for DMS. The process is easy. The manual indicates which files you should kill from the backup system diskette. As I use the DMS package with NEWDOS (instead of TRSDOS) some of the file names differed but it's fairly easy to determine which files to kill. Once loaded, you're ready to begin by dropping into Basic and running "DMS."

When executed, DMS displays a list (menu) of functions you may request. You select one of the functions by typing its menu number and DMS leads you through the function you chose with messages and replies.

The menu lists six functions: terminate processing, perform file management, print a report or labels, compact a file, perform file definition maintenance, and sort a file.

"Terminate processing" ends execution of DMS and returns you to Basic. "File maintenance" allows you to add, update, delete, inspect or search for a record in the file. "Print a Report or Labels" does just that using information in a file. "Compact a file" releases space taken up by deleted records and can also be used to create a backup copy of a file. "Perform file definition maintenance" creates, deletes and lists file definitions in the DMS file directory. "Sort a file" creates a copy of a file with the records in any requested order.

To use DMS you first have to decide what file you want to create and what information you want it to contain. You then use the file definition function to define the file and the file maintenance function to put in your information. Once a file has been created, you can add new records and manipulate existing records with the maintenance functions.

Before you begin, decide on the name for the file you wish to create. File names may be up to 8 characters long with both alpha and numeric representation as long as the first character of the file name is a letter. Every DMS file must have a different name. You also have to determine what fields you want in each record; you can have up to 24 fields. Each field has three components: the field ID (a "short" name of one to 5 characters that you will use to identify the field during operations); the field name (a full name from 1 to 15 characters long that will be used as a heading for the field when DMS prints reports); and the field length (the number of characters reserved for the field in each record of the file).

As it would be impractical to mention in a review each function and

operation DMS is capable of performing, I'll only cover some of the functions.

If you wish to delete a record, you call up the record you wish to remove and DMS displays the record to be sure it is the right one. If it is, DMS marks the record as "deleted." The record is "marked for deletion" only; it does not actually disappear until you compact the file. The marked record may be recovered by updating it in any way as this removes the delete mark. Once you compact, however, the record is gone. Although a record may be physically present in the file and can be recovered following its deletion by updating, a deleted record is invisible to the "scan" and "inspect" functions.

Compacting a file must be performed periodically. Doing so accomplishes several things: it removes deleted records from a file thereby freeing disk space for new records; it assigns new sequential record numbers to the records in the file; and it permits you to make a backup copy of the file. To compact a file to a new file, you perform three steps: create the new (compacted) file; rename the current (uncompacted) file; and rename the new file to replace the former current file. The switch sounds tricky if you've never done it before but, again, the manual takes you through the process step by step and provides illustrations to help you follow the process. It looks more complicated than it is.

Generating reports (or mailing labels) is one of the more impressive capabilities of the package. After you select the report generating function, DMS asks you to enter "run options," which are specifications that tell DMS how to format the report. Each run option takes the form of a keyword, an equal sign and a value. For instance, PFILE specifies the name of the file from which you wish to generate a report; ROUTE indicates where the report should go (video display or printer); TYPE specifies the type of output desired ("R" for report and "L" for labels); and DEPTH indicates the number of lines down from the top of one report page to the top of the next.

A nice feature (one that I haven't has a chance to try yet) of the label generating portion of this option is a "printer alignment pattern" the program puts out to give you a chance to assure correct positioning of your labels in a printer. You can print the pattern (a row of asterisks) as many times as necessary before you actually start to print the labels.

The package's sort function allows you to make a copy of a data file with the records sorted in any order you desire. DMS can sort on up to ten different fields at once. It puts records in order by the first key that you specify. If more than one record has the same value for a particular key, DMS puts them in order by the second key specified.

There are a lot of handy features with this package. One case is the ability to manipulate numeric fields. If the first character of a field ID is an asterisk, DMS recognizes the field as numeric; only numbers, a decimal point, and a leading sign may be input into that field. Other entries will be rejected by the software. The report generating function of DMS can edit numeric fields and compute totals on them; it will not do this for non-numeric fields even if those fields contain numeric values.

You also have a computed field facility in which the program can compute a value for a numeric field from the values given for other numeric fields in the same record. You specify the operations you wish to have performed to obtain the value of the computed field at the time you define the file and DMS automatically performs the calculations each time you add or update a record.

Let's say your file contains the names and grades of students in a class. If the fields for a record were *MATH (the grade from a math exam), *SPELL, *ENGL and *SCIEN, you can designate a field for *AVER (the average of all the grades). DMS lets you enter a computed field formula such as AVER = MATH + SPELL + ENGL + SCIEN/4. The only catch to this particular function is that operations in a formula are performed from left to right and not in the order of usual algebraic operations. Be careful how you set your formulas up. You can define as many computed field formulas as you wish but the total length of the formulas you define can't exceed 238 characters.

Another useful feature lets you save a report format for reports you wish to generate over and over. DMS saves you time and work by retaining a report's parameters. You can call up a report format by name. Report formats are stored in a file named REPRTFIL/DMS which you set up before you define any report formats. The manual illustrates how to set up the format file.

DMS also features "message numbers." These numbers appear to the left of any DMS prompt or message and may be used to refer to a specific section in the manual in which all message numbers and their corresponding messages are listed and defined. If you've been away from the program for any amount of time, for instance, you might forget what a particular prompt from DMS is requesting. In this case, you check the message number to the left of the prompt and refer to the message number definition in section 5 of the manual. The manual gives you both the meaning of the message or prompt and the required response for proper operation. (I wish other manufacturers had documentation this thorough.)

All in all, this package has a lot of versatility. In the first hour of use, I started a recipe index (I always have a hard time remembering in which magazine or cookbook certain recipes are and I just can't bring myself to cut them out because invariably there is a good recipe on the backside of the page as well) and an index of magazine articles I want to keep track of. That was in the first hour while I was still learning the basics of using the package. Additional sessions opened up even more possibilities.

The DMS package is a good, solid, professional piece of software. The programs work, the documentation is superior to most of the stuff that comes with software these days and the package offers a great deal of versatility in manipulating data you want to keep on file.

DMS is priced at $99.50 for the Apple II and $74.95 for the TRS-80.

Also available from Personal Software for most personal computer brands are a variety of games, utilities and business software.

Personal Software programs may be purchased at your local computer store or from Personal Software Inc., 592 Weddell Drive, Sunnyvale, CA 94086; (408) 745-7841.

WHAT'S COMING UP

SOFTWARE

Educational Software for Pet

Cow Bay Computing offers educational 8K and 16K Pet software. Pet Professor is a package of over 70 teaching programs in basic arithmetic skills. Step-by-step instruction covers addition, subtraction, multiplication and division of whole numbers, fractions and decimals.

Each program states its objective and supplies any necessary vocabulary. Then slowly and carefully an example is displayed and a "moving cursor" is used to lead the student through additional examples. It is comparable to a student watching a teacher do and explain the procedure, the company said.

When the student thinks that he or she has mastered the concept, a randomly produced five question quiz is given. Each operation (such as multiplication of whole numbers) is contained in several programs which are broken down into finer single concepts (such as one digit, 2 digits, with and without carrying, etc.).

The Pet Professor is being used successfully to introduce arithmetic in elementary grades and remediate in secondary grades. Its highly individualized style makes it ideal for minimal competency students, according to the company.

The package is priced at $299 on cassettes (2 programs per cassette) or $259 on 5-1/4" diskettes. A sample tape is available for $5. Additional software, priced at $15 to $20 each, includes Signed Numbers, Scrambled Spelling, Flashcard Math and The Graduated Cylinder. A full listing is available.

For more information contact Cow Bay Computing, Box 515, Manhasset, NY 11030. *Circle No. 127*

Business and Personal Software Packages for TRS-80

Small Business Systems Group is offering a software package for the small to medium size auto leasing firm, plus the Deluxe Personal Finance Package by Lance Micklus.

The auto leasing package includes two diskettes with sample data and a users manual. The system was designed to use the Radio Shack TRS-80 32K microcomputer with two mini disks and a line printer.

The programs provide vehicle maintenance, account maintenance, monthly billing and report generation. Vehicle records are accessible for financial update, display and list. Similarly, all account records may be updated with payments and aging noted through display and list. Reports are accomplished by vehicle number with special attention to the bank holding the mortgage and the leaser account number. Monthly statements are created noting payments and account aging.

The Deluxe Personal Finance Package includes a conversion procedure and upgrade for tape versions in the field. The new package is now available for use on the Radio Shack Level II TRS-80 32K microcomputer with two disks. The DPF system is a financial analysis package which can be readily customized to suit your personal financial situation. According to the company, it will: support up to 900 transactions per year in 33 different budget categories; separate cash and check disbursements; allow up to ten category disbursements per check; credit income/deposits according to source; search, correct or void checks; maintain an accurate checking account balance; cancel returned checks; provide monthly summaries of income vs spending; estimate and average monthly expenses; calculate profit/loss; summarize data by category; and provide up to ten savings account summaries.

For further information contact Small Business Systems Group, Corner Main Street & Lowell Road, Dunstable, MA 01827; (617) 649-9595. *Circle No. 118*

Data Base Management System

A hierarchical (tree-structure) data base management system (HDBS) for Z-80, 6502 and 8080 based micro-computers has been released by Micro Data Base Systems, Inc. The new system is offered at $250 for the Z-80 version and $325 for the 6502 and 8080 versions, and contains many of the features available in the earlier released CODASYL network data base systems (MDBS). HDBS, written in machine language, contains commands to add, delete, update, search and traverse the data bse. Users can define set relationships between record types in a number of different ways including sorting on various keys and FIFO, LIFO, NEXT and PRIOR orderings. Read/write password protection is provided at the File Level. Both MDBS and HDBS routines are callable from Basic, Fortran, Cobol and machine language. Other host language interfacing is in progress.

The major differences between HDBS and Micro Data Base Systems' full network data base system are in the complexity of the data structure and associated data manipulation routines, some data security features and price (MDBS lists at $750). Attempting to use HDBS where the natural structure is a full network requires that some data fields be repeated in several different records. This data redundancy introduces extra costs in loading and retrieving program and in storage. Whether the extra cost compensates for the savings obtained in purchasing HDBS must be evaluated by the user. MDBS is upward compatible with HDBS and such an upgrade costs $550. The HDBS-MDBS manual can be purchased alone for $55. For further information contact Micro Data Base Systems, Inc., P.O. Box 248, Lafayette, IN 47902; (317) 742-7388. *Circle No. 121*

Investment Management Program for TRS-80

Personal Finance Systems announced Investment Portfolio System, a data base management program, to be used by personal investors in management of stocks, bonds, Treasury bills, real estate and other investments.

The program will store and report data on as many as 72 securities, and review items in the portfolio by price, yield, and percent gain or loss. It provides four special reports: long and short term gain and a security analysis report. This latter report provides information about return on investment, annualized yield, earnings and yield gain compared to market

index — information the average individual investor has not been able to develop before, the company said.

Investment Portfolio System is available in a disk version for TRS-80 32K LII single drive computers, and in a tape version for 16K LII tape systems. Both programs are supplied on a single tape, so that a hardware conversion from one system does not require updating of software at additional expense. Conversion requires only that the program be loaded and saved to disk.

Documentation is a printed 38 page booklet containing the instructions, technical documentation, formulation and program listing. The price is $39.95 for the program and $7.50 for the documentation only. For more information contact Personal Finance Systems, 1446 Durham Rd., Madison, CT 06443; (203) 421-3379. *Circle No. 109*

Conversion Program for North Star and CP/M

The SoHo Group Inc., a group of software professionals, has announced a simple conversion program, dubbed The Matchmaker, which enables owners of North Star Basic and CP/M to combine the power of these two pieces of software. North Star owners can have dynamic file extension and creation, automatic reclamation of deleted files and all the other features of the CP/M operating system.

The combination of features of the North Star interpreter include multi-line functions, byte and random access to CP/M files, BCD arithmetic, and other features of North Star Basic.

Conversion requires no disassembly, searching, computation or machine coding. It consists of loading North Star Basic, booting in CP/M and running a completely automatic conversion program. A dozen bytes are then patched, using the DDT debugging facility provided with CP/M, and you're on the air. A simple checklist of instructions is provided.

The Matchmaker is priced at $89.95 (manual only, $9.95). For more information contact the SoHo Group, 140 Thompson St., Suite 4-B, New York, NY 10012. *Circle No. 115*

Stock Market Charting for the Apple II

RTR Software has announced their software package Market Charter, an enhanced version of the RTR Stock Market System. Market Charter is a technical analysis package for following stocks and commodities.

The charting program features Hi-Lo-Close charts, negative and positive volume indicator charts, volume charts and comparison charts. Any simple, exponential or weighted moving average can be plotted, as can trend lines, speed resistance lines, horizontal lines and trading bands. Hard copy of the charts and data can be obtained. A versatile file maintenance program allows creating and updating of the data base, adjusts for stock splits, and so forth.

The programs are menu driven and easy to use. Documentation explains not only the use of the software, but also standard interpretations of the indicators.

Market Charter retails for $99.95. For more information contact RTR Software, P.O. Box 12351, El Paso, TX 79912; (915) 544-4397. *Circle No. 124*

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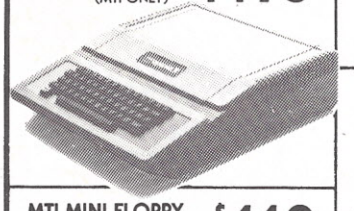
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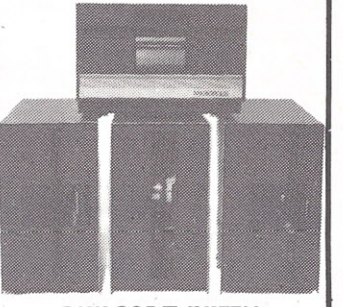


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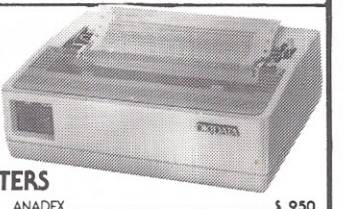
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CIRCLE 31

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CIRCLE 38

WHAT'S COMING UP

TRS-80 Word Processing

Radio Shack's Scripsit word processing system for the Model I TRS-80 Microcomputer System includes full editing and formatting capabilities in both tape and disk formats.

According to Radio Shack, Scripsit utilizes an audio tape teaching system to familiarize you with the features of the program. You listen to the tape and follow the directions. Sample material used with the tapes demonstrates the program's features.

The TRS-80 Scripsit Word Processor defines a special control key on the keyboard. The control key, used in conjunction with 14 regular keys, lets you move words or paragraphs, insert, delete and edit. Press-on labels are provided to aid in identifying the special keys.

Scripsit software allows you to compose letters and documents of all types on the TRS-80's screen using upper case, or upper and lower case when Radio Shack's Upper/Lower Case kit has been installed in the computer.

Document chaining lets you load more than one document into the TRS-80 at one time for merging, inserting and other operations. Scripsit provides automatic page numbers, page headings and footnotes, and makes it easy to indent paragraphs, changes line widths and center the test vertically or horizontally.

The system also provides single sheet printing capability

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Invaders One **$14.95**
Same as the ARCADE with sound effects too. In machine language!

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For the graduates of INVADERS ONE, you may trade your old tape for INVADERS PLUS by sending it with $5.00 plus $1.50 shipping & handling. This one is totally graphic and twice the speed!

Galactic Empire **$14.95**
A real time space game which you will play for hours and hours and (NOT a Star Trek Game!) This is the next generation of space games!

Galactic Trader **$14.95**
By Doug Carlston, this is a sequel to Galactic Empire. Now that you have conquered the Galaxy and created an Empire, you now turn merchant. Happy Trading! If you liked Galactic Empire you'll love Galactic Trader!

Galactic Revolution **$14.95**
Another creation by Doug Carlston, this sequel to the Fantastic Galactic series has sound effects too!

Space Battles ..... **$14.95** tape, **$19.95** disk
... a real time Star Trek type game

Simutek Package I **$14.95**
This one is an unbelievable value with graphic Star Trek and space target, just to name a few!

MEANWHILE, BACK ON EARTH ...

Dr. Chips **$14.95**
This tongue-in-cheek party psychiatrist will leave you in stitches!

3D Tic-Tac-Toe ..... **$ 7.95**
3 dimensional Tic-Tac-Toe with 3 skill levels. Takes less than a minute per move! Rated in top ten in first issue of *80-Software Critique!* By Scott Adams.

Z-Chess 2 ..... **$17.95**
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Back-40 ..... **$14.95**
Rated better than Fastgammon! Machine language Backgammon allows doubling too!

Backgammon ..... **$ 7.95**
Basic version with structured code and many in line comments. Takes 40 seconds for a move and is quite challenging! By Scott Adams

LET'S GET SERIOUS FOR A MOMENT ...

Disk Index Manager **$14.95**
For TRS-80, create a data base of all your disk files by program names! Find which disk a particular program is on fast! Search on a full program name or by any subject. Even allows user definable classes which you can put each program into. (such as games, business, utilities, etc.) Of all the disk directory type programs available, this one definitely has the most features! Will run on 32K or 48K single or multi-drive systems with any operating systems. We highly recommend this organizer by Don McCafrey!

Welcome USA ..... **$ 9.95**
Fun Filled Educational Program by Bill Presby!

Dispatch ..... **$ 9.95**
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CIRCLE 32

WHAT'S COMING UP

to print a multiple-page document on individual sheets of paper, such as a company letterhead. In this mode, Scripsit prints one page then waits until you are ready to print the next page, then continues in this manner until all pages have been printed.

In addition, the disk version can be used to create and edit Basic programs stored in ASCII format.

A system required to use Scripsit includes a Model I TRS-80 16K Level II microcomputer and printer (such as Radio Shack's Line Printer II or new WP-50 daisy wheel printer and printer cable). For the disk system a 16K expansion interface and one disk drive is also required.

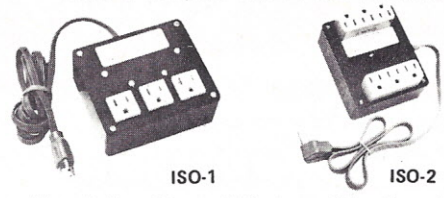
The TRS-80 Scripsit for use with a disk system is supplied in a three-ring binder with one program diskette, blank data diskette and manual. The tape package comes in a binder with program tape, blank data tape and manual. Both packages include a pocket-size Quick Reference Card and an audio tape instruction system (three cassettes) to familiarize you with Scripsit.

The system is available from participating Radio Shack Computer Centers, stores and dealers nationwide. Prices are: $69.95 for tape system; $99.95 for disk system. An optional Upper/Lower Case Kit is available for $99 installed.

For more information contact Radio Shack, 1300 One Tandy Center, Fort Worth, TX 76102; (817) 390-3272.

Circle No. 112

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CIRCLE 39

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Copies multiple files with a single command using masked select options! Source disk may be non-operating system disk. Single drive capability. Recover bad files — invalid sectors itemized but copy continues.
Merge files with or without replacement.

Superzap (SZAP)
Display or print and modify standard TRSDOS diskette track and sector data. Full screen edit mode. Automatic repeat scan and print. Copy disk sectors — any number of sectors to same or other drive.

Disk Identification (DISKID)
Change diskette names!

Extended Create (XCREATE)
Creates and initializes file to end.

DOCUMENTATION
Complete documentation of above utilities including a full discussion on recovery of lost data on diskettes!!!

INFINITE BASIC for MOD I TRS-80™ Tape and Disk System Extensions to Level II and Disk BASIC $49.95
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CIRCLE 33

Cobol for Cromemco Systems

A version of Cobol is available for Cromemco Z-80 based microcomputer systems. This version, which is based on American National Standard X3.23-1974, contains several important new features, including interactive ACCEPT, and DISPLAY, file naming at runtime, LINAGE for printer files and more efficient compiler memory usage.

The enhanced ACCEPT and DISPLAY allows you to write programs which display items anywhere on the terminal screen and accept data from any location. Files may be named at runtime by storing the desired name into a data item and then opening the file.

The LINAGE clause allows you to declare the page length and size of the top and bottom margins. Cobol will maintain a line count and perform a programmer-specified action, such as page subtotal, when the page body becomes filled.

A compiler memory usage algorithm permits compilation of a program containing more than 3000 lines in a Cromemco system with 64K of memory.

Cobol includes all ANSI Level I features for the nucleus and for sequential, relative and indexed file handling; table handling; library; and inter-program communication facilities. It also includes Level 2 options such as STRING, UNSTRING, COMPUTER, SEARCH and PERFORM; abbreviated and compound conditions; and condition names.

Cobol is available on 5″ (Model FDC-S) and 8″ (Model FDC-L) IBM-format, floppy diskettes for $95. For additional information contact Cromemco, Inc., 280 Bernardo Avenue, Mountain View, CA 94043; (415) 964-7400.
Circle No. 111

Apple Music Synthesizer

American Micro Products, Inc., markets a flexible, low cost music synthesizer designed to plug into any 48K Apple computer using Applesoft Basic. The "Juke Box" produces three simultaneous voices and one channel of white noise. Pitch, rhythm, tempo, attenuation and envelope can be selected and controlled for each voice independently from the other channels.

The synthesizer has a five octave range starting at 55 Hz (the A below the bass clef) to 1760 Hz (the second A above the treble clef). Each card has an on-board amplifier capable of directly driving an eight ohm speaker. As many as six can be installed to generate a total of eighteen notes. Multiple boards can create stereophonic, quadrophonic and polyphonic operation. In addition, the synthesizers can be daisy chained to create more voices per speaker. For those applications where quality is of secondary importance (for example, sound effects using the channel of white noise), the board can be connected directly to the Apple internal speaker.



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CIRCLE 34

A high level graphics music editor is provided with each unit. This interactive software enables music to be composed, edited, played and stored on a diskette. Each note can be seen and heard as it is input and edited.

Price for the "Juke Box" synthesizer with graphics music editor is $129.95. Delivery is from stock. For more information contact American Micro Products, Inc., 705 N. Bowser, MS 107, Richardson, TX 75080; (214) 238-1815.
Circle No. 105

PERIPHERALS

Produce Music on TRS-80

Newtech Computer Systems has introduced The Music Box, a hardware/software tool that enables you to produce music and sound effects on your TRS-80.

You can compose music, play or sing along with the computer, or just listen to your favorite tunes — up to four notes at a time, with a seven octave range. You can also make it sound like one, two, three or four different musical instruments at the same time, or make sound effects and noises like explosions, gun shots, "phaser" and other space war sounds.

The Music Box plugs directly into the TRS-80 keyboard or the Expansion Interface Bus Extension. It includes a volume control, a 400 milliwatt power amp and phono jack for easy



connection to an external speaker. Software is supplied on Level II cassette. The unit requires a 32K Ram or larger Level II computer.

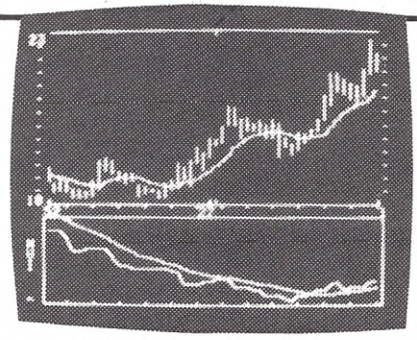
Price is $249 complete with software and user's manual. Add $3 for shipping and $1 if COD. For more information contact Newtech Computer Systems, Inc., 230 Clinton St., Brooklyn, NY 11201; (212) 625-6220.

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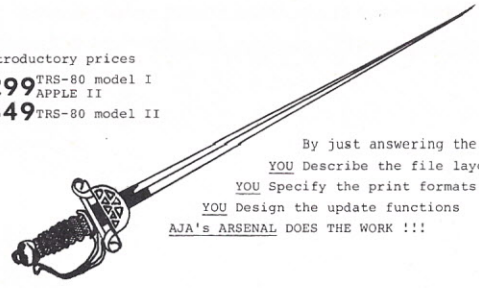
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CIRCLE 35

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*Program descriptions for the APPLE II ARSENAL differ slightly.

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CIRCLE 36

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CIRCLE 37

Voice Synthesizer

Votrax Model VSB is a single circuit board unit capable of generating an unlimited vocabulary in seven different languages. It interfaces with a variety of computer terminals, electronic typewriters and word processing equipment.

Compact in size, because the entire synthesizer is contained on a single circuit board, the VSB can produce an unlimited vocabulary because it stores not words, but phonemes, the building blocks of words. Words are generated by a series of electronic commands that produce the various phonemes which comprise human speech. The commands also control degrees of inflection that contribute to the meaning of each word and phrase.



The VSB Voice Synthesizer requires eight parallel data bits to create each phoneme, six of which are for phoneme selection and two for inflection. Each eight-bit command selects one of 63 phonemes which generates the vocal sound desired. The next eight-bit command selects the next sound, and so on until the word is built. There are approximately the same number of phonemes in a word as it has letters.

Provision is made in the VSB for natural conversational flow by a built-in clock output which indicates the time of insertion of commands into the system. To provide flexibility, pauses to allow separation of clauses and phrases, as well as sentences, are standard. In addition, along with the manual controls for rate, volume and pitch, a tone control allows you to adjust vocal output for esthetic or ambient noise considerations.

Model VSB Voice Synthesizer was developed to meet a wide variety of applications. A range of interface types and options makes it compatible with most computers Votrax said. The VSB single circuit board is priced at $280 each. For additional information contact Votrax, 500 Stephenson Highway, Troy, MI 48084. *Circle No. 101*

Dot Matrix Printer, Cables

Matchless Systems developed two new products for the microcomputer market.

The first, the MS-204 Printer, is compatible with the TRS-80, Apple, Pet or any other Centronics-type system. This 132-column, bi-directional, 9 x 7 dot matrix printer utilizes a print mechanism of simple design and high reliability, the company said. It has a print head life of 100 million characters.

Among the features are a print speed of 125 cps and a throughput print speed of 63 lpm. The adjustable sprocket feed mechanism allows use of forms from 2-1/2" to 9-1/2" wide, with loading from either the bottom or rear. A full 96

ASCII set permits printing upper and lower case characters which can be expanded for double-width fonts in bold face. The VFU (Vertical Format Unit) provides pre-programmed/programmable tab positions, top of form and bottom of form. The retail price is $795.

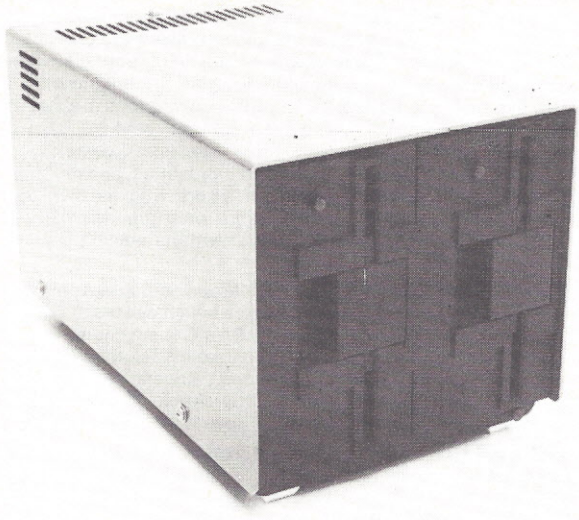
Computer cables represent the second product line now offered by Matchless, which provides off-the-shelf availability of cables for drives and printers, as well as specialty units such as tape drive cables. Retail price for the two-drive cable is $24.50, and the four-drive cable is $34.50. The cable for the MS-204 Printer (and other printers such as Anadex, Microtek, Emako or other Centronics-compatible printers) sells for $34.50. Prices for the custom-made cables are available on request. For more information, contact Matchless Systems, 18444 Broadway, Gardena, CA 90248; (213) 327-1010. *Circle No. 107*

TRS-80 Compatible Dual Disk Drive

A TRS-80 compatible dual disk drive with a capacity equal to four Radio Shack disk drives has been introduced by Computhink Inc.

The new single density, dual-head 5-1/4″ minifloppy drives provide 400K bytes of on-line storage capacity, more than four Radio Shack drives combined according to Computhink. Forty tracks are utilized in the Computhink system.

The Computhink drives utilize the TRS-80 disk controller and are completely compatible with both the TRS-80 Disk Operating System and standard Radio Shack diskettes.



The new minifloppy drives join Computhink's line of Pet-compatible 400K, 800K and 1.6 megabyte capacity disk drives. Additionally, Computhink recently introduced the Minimax, a microcomputer system for use by small businesses and independent software organizations.

The TRS-80 compatible floppy priced at $1295, is available for immediate delivery. For more information contact Computhink, 965 West Maude Ave., Sunnyvale, CA 94086; (408) 245-4033. *Circle No. 136*

TRS-80 SOFTWARE 5110
& MODII PET CBM 5120

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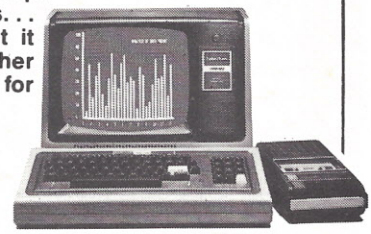
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CIRCLE 40

TRS-80 LEVEL II $720. COMPLETE SYSTEM

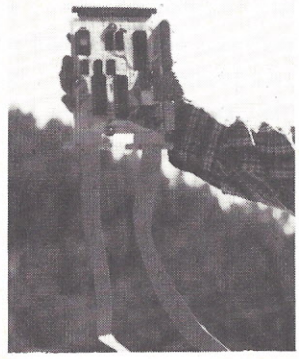
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CIRCLE 42

WHAT'S COMING UP

Combination Printer Package

MicroPro offers a file management/S-100 interface/low-cost printer combination package designed for use with all CP/M and MP/M compatible microcomputer configurations.

Combined are the MicroPro WordStar word processing software, I/OMaster interface board and letter quality, 55 cps NEC spinwriter parallel printer.

Because the drivers and functions normally found in more expensive serial printers are contained within the WordStar software and the I/OMaster interface, the MicroPro/NEC System offers a cost-effective alternative for the word processing user, the company said.

Increased printing speed and optional twin-sheet feeding are additional features available with the parallel printer, the company said.

Other features include the capability of simultaneous use of high speed line printers (Centronics or Data Products compatible) and dual synchronous/asynchronous serial ports with FIFO buffering to prevent loss of keystrokes during disk I/O and MP/M task switching, as well as an eight level interrupt controller and dual interval timer circuitry.

The total MicroPro/NEC system is priced at $3195. For more information contact MicroPro International Corporation, 1299 Fourth Street, San Rafael, CA 94901; (415) 457-8900. *Circle No. 110*

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CIRCLE 43

WHAT'S COMING UP

SYSTEMS

Word/Data Processor for Professionals

Alpha Professional Systems has introduced an operating system incorporating four packages to expand the capability of their Alpha System 7 word/data processing system for lawyers, physicians, dentists, accountants, architects and advertising agencies.

The Pegasus Operating System features data communication, word processing file merge, simultaneous printout of multiple-queued documents and financial computation as an enhancement to the System 7's client billing and small business packages, the company said.

The communications package allows transfer of both word processing and data processing file and correspondence at 300 to 2400 baud, allowing operators to converse on-line between workstations. Simultaneous printout permits many documents to be queued — up to a total length of 220,000 alphanumeric characters — to the printer. Unrelated word or data processing can then be continued during printout.

For word processing functions, Pegasus' file merge package allows any word processing file to merge with other WP files. Customized letters, reports, contracts, proposals or legal pleadings can then be produced by inserting variables in the appropriate part of the document. Text is reformatted and margins are rejustified automatically.

The financial program incorporates 23 separate functions including loan amortization, sinking funds, commercial paper, yields, depreciation and future values.

Alpha Professional's System 7, with 64K RAM, dual 8″ floppy disks, 1920-character CRT and letter-quality printer, is priced at $14,000, including word processing and calendar control. Existing systems can be retrofitted with Pegasus for $295.

For further information contact Alpha Professional Systems, 9465 Wilshire Blvd., Suite 518, Beverly Hills, CA 90212; (213) 272-3032. *Circle No. 100*

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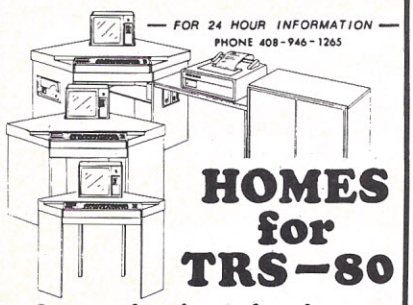
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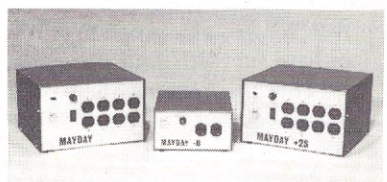
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Enhancements to Wang 2200 Computers

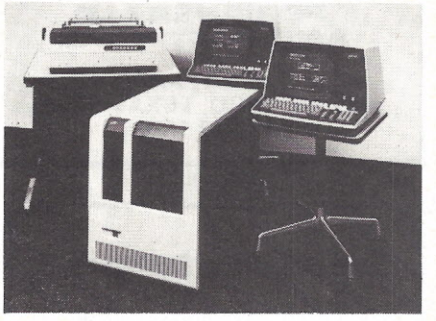
Wang Laboratories, Inc., has announced high-performance, low-priced options for small business systems users with a series of enhancements to its 2200 family of computers.

Programmable in the Wang Basic-II programming language, the new 2200 SVP small business computer system is offered with a 32K bytes processor, a Wang 2236 terminal and the newly designed single-sided, double-density diskette, increasing storage capacity to almost twice that of conventional diskettes.

A single-user system, the 2200 SVP's memory is expandable to 64K bytes. Other options include a 120 cps printer, a second single-sided, double-density diskette or the addition of a two or four megabyte Winchester-style disk drive. Standard features include business graphics.

The 2200 SVP supports full asynchronous and bisynchronous telecommunications protocols. Complete systems are priced from approximately $12,000 to $20,000.

The new features of the 2200 LVP small business computer include a sophisticated fixed disk storage system offered in either two, four or eight megabytes storage capacity. This disk system provides fast data or program



access in a compact space, while eliminating the high cost associated with removable media-type drives, Wang said.

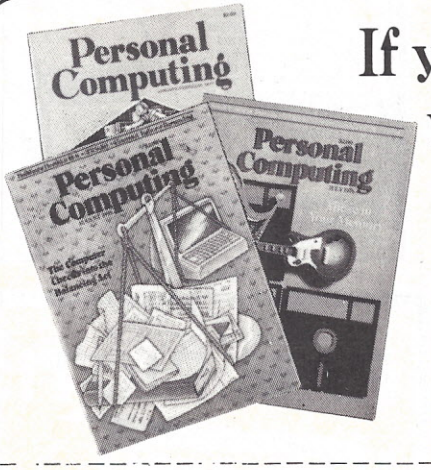
In addition, back-up is provided through dual-sided, double-density diskettes that are format compatible with IBM 3741 type diskettes and are capable of storing one megabyte each.

User memory for the 2200 LVP consists of 32, 64 or 128K bytes, and features 60K of machine memory which removes almost all the overhead from the user memory. Wang Basic-II programming language is supported by the system.

Wang customers will be able to upgrade their systems, as the 2200 LVP is compatible with the 2200 SVP, 2200 VP and 2200 MVP small business computer systems.

Most industry standard communications protocols are supported on the system, including both asynchronus and bisynchronous telecommunications protocols. Systems are priced from $15,000 to $35,000.

The PCS-III small business computer system, the new low end of the popular Wang 2200 series, replaces and will be priced the same as the PCS-II. Though similar in appearance to the PCS-II, the



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new Wang system has incorporated newly designed memory technology through the use of single-sided, double-density diskettes. This feature brings the mini-diskette storage capacity to approximately 140K per drive, nearly doubling the conventional storage capacity and considerably improving disk data access speeds, Wang said.

User memory is offered in 32K bytes only, and an optional single-sided double-density diskette is available. The PCS-III supports the Wang Basic programming language, and all options available on the PCS-II, including system disk multiplexing to larger Wang 2200 series computer systems.

PCS-III is designed to serve a range of user needs, from data entry and capture to scientific test monitoring and business programs. Systems are priced from $6500 to $10,500.

The newly designed 2280 Disk Multiplexor unit supports up to three 2200 VP/MVP/LVP central processing units. The unit can support up to three CPUs and has a maximum cable distance of up to 1000 feet, available in increments of 25, 50, 100, 250, 500, 750 or 1000 feet.

Pricing begins at $2000 for the Disk Multiplexor, and $500 for each CPU supported.

For more information contact Wang Laboratories, Inc., One Industrial Ave., Lowell, MA 01851; (617) 459-5000.
Circle No. 142

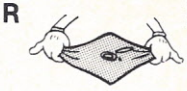
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section for the video monitor and printer. A shelf provides storage for tapes, disks or manuals. The desk has a simulated walnut finish.



The desk costs $49.95 and is available from Radio Shack stores, dealers and computer centers. Radio Shack, 1300 One Tandy Center, Fort Worth, TX 76102; *Circle No. 139*

Flexible Disks

Dennison Kybe Corporation has announced a new line of flexible disks, mini flexible disks and magnetic cards.



Certified 100% error-free and rated to handle more than 12 million passes without media related errors or significant wear, the line includes models for almost all data or word processing systems.

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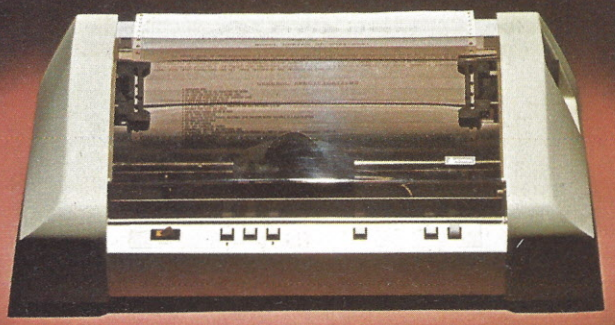
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CIRCLE 59



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